

BETTER HOUSING FOR TOMPKINS COUNTY ELDER COTTAGES:
DESIGN EVALUATION AND FUTURE RECOMMENDATIONS

A Thesis

Presented to the Faculty of the Graduate School

of Cornell University

In Partial Fulfillment of the Requirements for the Degree of

Master of Arts

by

Joelle Lara Lichtman

January 2011

© 2011 Joelle Lara Lichtman

ABSTRACT

By 2020, 55 million people in the United States are predicted to be over 65 years of age (U.S. Census Bureau, 2004). As such, additional housing options need to be available for this growing population. It is imperative that housing for older adults support their changing needs and abilities. While the majority of older adults wish to age in place by remaining in their current residence for as long as possible (AARP, 2000), the design of their home may be unsuitable for older adults. For example, those with limited mobility may find it difficult to enter their home if they need to climb up a set of stairs to do so. Therefore, one housing option for seniors who wish to remain independent but cannot remain in their own home is to move into an elder cottage, or ECHO (Elder Cottage Housing Opportunity) housing.

An elder cottage is a type of accessory dwelling unit temporarily placed next to the home of an older adult's child. The cottages are modular homes designed with basic accessibility features enabling older adults to live independently, yet still receive care from their nearby family. Once the cottage is no longer needed, it can be moved to a different location to be used by another older adult. Specifically, Better Housing for Tompkins County (BHTC) administers one such elder cottage program in Tompkins County, New York.

This thesis evaluates the design of BHTC's elder cottages through the compilation and assessment of interviews with cottage residents and their family members, as well as observations of the residents interacting with the cottage environment.

Overall, the residents of BHTC's elder cottages are satisfied with the program. The residents enjoy the independence the cottage provides as they are able to maintain a high quality of life. However, although built to be handicap accessible, the design of the cottage does not fully support the full range of changing needs of elderly residents.

Therefore, design recommendations to be incorporated into a new elder cottage design are discussed.

These recommendations incorporate the principles of universal design and visitability into the design of the elder cottage. Universal design ensures that the design of the environment and the products within it are usable by everyone, regardless of their age or abilities. Visitability is a movement to make all homes accessible by providing a zero-step entry, wide doorways and an accessible bathroom on the first floor of the home. The new elder cottage design is discussed through the lens of the seven major issues brought about through data collection: accessibility, ability to support social interaction/quality of life, ability to support activities of daily living and instrumental activities of daily living, affordability, sustainability, transportability/structural stability and zoning regulations.

The findings of this study fill a gap in previous ECHO housing research as it has yet to focus on the cottage design. This research proposes a new design for Better Housing for Tompkins County's elder cottages that can enhance the lives of the residents and encourage the use of elder cottages as a safe housing alternative for the growing older adult population.

BIOGRAPHICAL SKETCH

Joelle Lichtman is from Melville, New York. In high school, she developed a passion for architecture and design. She therefore decided to study Interior Design at Cornell University in the department of Design and Environmental Analysis. Throughout her undergraduate career, she became interested in how to design environments specifically for older adults. In 2009, Joelle graduated from Cornell with a Bachelor of Science and received the Gerontology Certificate from the College of Human Ecology.

Joelle decided to attend graduate school at Cornell University as part of Design and Environmental Analysis' 4+1 program. She will receive a Masters of Art in Interior Design, specializing in Interior Design for Special Populations, specifically design for the senior population.

After completing her master's degree, Joelle hopes to relocate to New York City to pursue a career in housing for the elderly. As a Certified Aging-in-Place Specialist, she hopes to assist older adults successfully age in place.

To the residents who brought this thesis to life.

ACKNOWLEDGMENTS

First and foremost, I would like to thank my family for their support throughout my time at Cornell. Thank you to my sister, Lauren, who spent countless hours helping me through this process, and to my parents for their unconditional love and encouragement.

Thank you to my thesis committee, Professors Paul Eshelman and Elaine Wethington, for their guidance and support. Thank you to all of my other professors and classmates at Cornell. Your words of encouragement were always greatly appreciated.

Lastly, I would like to thank those living in the elder cottages and their families who welcomed me into their homes. I learned so much from everyone, and especially enjoyed getting to know the residents and talking not only about my research, but about life in general. I will never forget the time we shared together.

TABLE OF CONTENTS

BIOGRAPHICAL SKETCH.....	iii
DEDICATOIN	iv
ACKNOWLEDGMENTS	v
LIST OF FIGURES	viii
LIST OF TABLES	x
LIST OF ABBREVIATIONS	xi
Introduction	1
Importance of Housing in Old Age	4
Home modifications.	7
Affordability issues.	10
Societal responses to housing needs for the elderly.	11
Emerging Trends in Senior Housing	13
International Granny Flat History	18
Australia.	18
New Zealand.....	20
Canada.	21
ECHO History in the United States.....	21
Better Housing for Tompkins County’s ECHO Program History.....	25
Program history.	26
Current position of BHTC ECHO program.....	30
Site description.	31
Research Questions	35
Method.....	36
Research Design	36
Participants	36
Site Selection.....	37
Information Gathering Procedure.....	37
Information Analysis Procedure.....	39
Results	40
Resident Profiles.....	40
Resident A.	40
Resident B.	42
Resident C.	44
Resident D.	45
Main Issues.....	47
Accessibility.	47
Ability to support social interaction/quality of life.	53

Ability to support ADLs and IADLs.	58
Affordability.	61
Sustainability.	62
Transportability/structural stability.	62
Zoning regulations.	63
Overall Reaction.	65
Discussion.	67
Guiding Principles.	67
Seven Key Issues.	69
Accessibility.	69
Ability to support social interaction/quality of life.	88
Ability to perform ADLs and IADLs.	91
Affordability.	94
Sustainability.	96
Transportability/structural stability.	99
Zoning regulations.	103
Conclusion.	104
Study Limitations.	105
Policy Implications.	105
APPENDIX A.	107
APPENDIX B.	109
APPENDIX C.	110
APPENDIX D.	111
APPENDIX E.	112
APPENDIX F.	114
APPENDIX G.	115
APPENDIX H.	119
REFERENCES.	135

LIST OF FIGURES

<i>Figure 1.1.</i> Housing quality score and self-reported health status - all households.....	6
<i>Figure 1.2.</i> Required home modifications in dwellings of handicapped residents.	9
<i>Figure 1.3.</i> Housing quality scores and SES score, all households.	10
<i>Figure 1.4.</i> Map of New York State highlighting Tompkins County	26
<i>Figure 1.5.</i> Map of Tompkins County.....	26
<i>Figure 1.6.</i> Installation of elder cottage on site.....	32
<i>Figure 1.7.</i> Floor plan of BHTC's elder cottage.....	33
<i>Figure 1.8.</i> Diagram of original bathtub in elder cottage.....	34
<i>Figure 3.1.</i> Resident A's walk-in shower.	42
<i>Figure 3.2.</i> Plastic protector at the bottom of resident A's doors.	42
<i>Figure 3.3.</i> Resident A's extended porch.	42
<i>Figure 3.4.</i> Resident C's new shower stall.....	45
<i>Figure 3.5.</i> Resident C's brightly painted living room.	45
<i>Figure 3.6.</i> Resident D's ramp as built by BHTC.....	46
<i>Figure 3.7.</i> Additional handrails installed on Resident A's ramp.....	48
<i>Figure 3.8.</i> Uneven transition on resident D's ramp.	48
<i>Figure 3.9.</i> Concrete blocks at the base of resident A's ramp.....	48
<i>Figure 3.10.</i> Small round knobs on closet doors.....	49
<i>Figure 3.11.</i> Original round knobs on exterior doors.....	49
<i>Figure 3.12.</i> Modified lever door knobs on resident A's exterior doors.....	49
<i>Figure 3.13.</i> Open floor space in bathroom.	50
<i>Figure 3.14.</i> Resident D's empty cottage kitchen.	51
<i>Figure 3.15.</i> Rocker light switches.....	57
<i>Figure 3.16.</i> Toggle light switches.....	57
<i>Figure 3.17.</i> Modification made to resident A's recliner.	59

<i>Figure 3.18. Resident A and C's modified toilets.</i>	59
<i>Figure 3.19. Resident C's cluttered kitchen.</i>	60
<i>Figure 4.1. Kitchen image from Ed Guion's website.</i>	70
<i>Figure 4.2. Bathroom image from Ed Guion's website.</i>	70
<i>Figure 4.3. Example of visitable home with a zero-step entry.</i>	72
<i>Figure 4.4. ADA ramp standards for handrail extensions.</i>	74
<i>Figure 4.5. ADA standards for size and spacing of handrails and grab bars.</i>	74
<i>Figure 4.6. Example of open floor plan.</i>	76
<i>Figure 4.7. Existing bathroom in the elder cottage</i>	78
<i>Figure 4.8. Example of walk-in shower with integrated shower seat</i>	79
<i>Figure 4.9. Comfort height toilet.</i>	80
<i>Figure 4.10. Adjustable height sink.</i>	81
<i>Figure 4.11. Shelves and pull-out storage provide easier access.</i>	84
<i>Figure 4.12. Counters at different heights and pullout cutting board.</i>	84
<i>Figure 4.13. Easy to read and reach oven controls.</i>	85
<i>Figure 4.14. FabCab kitchen and open living area.</i>	88
<i>Figure 4.15. Special hardware allows upper shelving to be lowered.</i>	92

LIST OF TABLES

Table 1.1. <i>Housing quality and psychosocial benefits</i>	6
---	---

LIST OF ABBREVIATIONS

AARP	American Association of Retired Persons
ADA	Americans with Disabilities Act
ADL	Activity of Daily Living
ADU	Accessory Dwelling Unit
AoA	Administration on Aging
BHTC	Better Housing for Tompkins County
CAPS	Certified Aging-in-Place Specialist
CCRC	Continuing Care Retirement Community
CDC	Centers for Disease Control
CIAIP	Community Innovations of Aging in Place Initiative
COFA	Tompkins County Office for the Aging
DHCR	New York State Division of Housing and Community Renewal
ECHO	Elder Cottage Housing Opportunity
GEM	Gerontological Environmental Modifications
HOST	Housing Options for Seniors Today
HUD	U.S. Department of Housing and Urban Development
IADL	Instrumental Activities of Daily Living
LARES	Large Analysis and Review of European Housing and Health Status
NAHB	National Association of Homebuilders
NORC	Naturally Occurring Retirement Community
OCD	Office for Community Development
PLUS	Portable Living Units for Seniors
SES	Socioeconomic Status
TCA	Tompkins Community Action
WHO	World Health Organization

Introduction

According to the 2000 United States Census (U.S. Census Bureau, 2004), the population age 65 years and older consisted of approximately 35 million people. It is predicted that by 2020, the number of people 65 and older will increase to 55 million due to the aging of the baby boomer population - those born between 1946 and 1964 (National Association of Home Builders [NAHB], 2007b). The Administration on Aging (AoA) found that in 2008 over half (54.6%) of noninstitutionalized people age 65 and over lived with their spouse; however, about 30.5% of noninstitutionalized older adults were living alone (AoA, 2010). Older women often outlive their husbands and are therefore are those who are living alone (Oswald & Wahl, 2004), as only 28.9% of women 75 years or older lived with a spouse in 2008 (AoA, 2010).

Many noninstitutionalized older adults are diagnosed with having a disability, the majority of who therefore need assistance in daily living. Of those aged between 65 and 69 in 2005, 37.4% reported they had a disability, 7.6% of who needed assistance due to that disability. With age, the prevalence of disability increases, with people 80 years and older having the highest rates of disabilities (U.S. Census Bureau, 2008). Additionally, many older adults need assistance with activities of daily living (ADLs) including bathing, showering, dressing, eating, transferring, toileting and getting around the home. According to the National Health Interview Survey from 2003-2007 (Centers for Disease Control and Prevention [CDC], 2009), 5.7% of people aged 65 and older had limitations in performing ADLs. The same survey found that 12.2% of people over the age of 65 had some sort of limitation in performing instrumental activities of daily living (IADLs). IADLs include everyday household chores, doing necessary business, shopping or getting around for other purposes. Of those who need assistance, 82% age 45 and older would prefer to get assistance in their current home, 9% said they would move to a facility where care is provided and

only 4% said they would move to a relative's house to receive the necessary care (CDC, 2009). This supports the idea that people desire to remain in their current residence for as long as possible, otherwise known as aging in place (American Association of Retired Persons [AARP], 2000).

While the majority of older adults prefer to age in place, their homes may not be designed to accommodate older users. Physical barriers, such as stairs and narrow hallways, may prohibit older adults from easily moving around their home. The AoA (2010) found that in 2007 the average construction year for homes of older adults was 1969, and that 4.4% of these homes presented physical barriers. Therefore, these homes did not accommodate the changing needs of older adults since they had lived in their residences for a long time without making any substantial modifications (Oswald & Wahl, 2004). Additionally, these homes, which may be deteriorating due to their age, can have a negative effect on the physical health of the elderly residents (Quadagno, 2008).

Appropriately designed homes for older adults can greatly enhance their quality of life, enable them to fully enjoy their home, and support them in entertaining visitors of varying abilities (NAHB, 2007b). Those who perceive their home as useful and meaningful and who are independent in daily activities are overall in better health (Oswald et al., 2007). As such, safe homes need to be designed for the elderly, allowing them to remain independent, but still receive the necessary care they need.

Incorporating the principles of universal design allows a home to meet the needs of different populations, especially the elderly. Ron Mace, founder and former program director of The Center for Universal Design, defines universal design as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Jordan, 2008, p. 10). There are seven principles of universal design, they include: equitable use, flexibility

in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use (Jordan, 2008). The following definitions come from Connell et al. (1997) at The Center for Universal Design and North Carolina State University:

Equitable Use: The design is useful and marketable to people with diverse abilities.

Flexibility in Use: The design accommodates a wide range of individual preferences and abilities.

Simple and Intuitive Use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Low Physical Effort: The design can be used efficiently and comfortably and with a minimum of fatigue.

Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility.

One remedy to ameliorate inadequate design and to meet the needs of the elderly is ECHO (Elder Cottage Housing Opportunity) units. ECHO units, or elder cottages, are small modular homes placed on the property of an older adult's child. These housing units allow older adults to maintain their independence by living in their own cottage, but still receive support from the host family living in the main house on the property. One example is the Elder Cottage program run by Better Housing for Tompkins County (BHTC) located in Tompkins County, New York.

While an elder cottage is a possible solution to the housing needs for older adults, there has been little research performed on the effectiveness of the design of elder cottages to accommodate the changing needs of its residents. Therefore, the research presented in this thesis is relevant because it fits this gap in previous research.

Specifically, this thesis assesses the design characteristics of Better Housing for Tompkins County's elder cottages, and proposes how a future design can be improved to better support the changing needs of its residents. This introduction outlines the relevant literature to the design of elder cottages and speaks to the importance of independent and safe living for the elderly. Next, the method employed in this study is discussed. The findings of this research are outlined in the results section, incorporating outcomes from interviews, observations and the literature review. Finally, design recommendations based on the principles of universal design are presented to be incorporated in future elder cottage designs. While the results show that BHTC's elder cottages satisfy the current residents, the cottage design does not fully support the changing needs of its residents and therefore could be improved.

Importance of Housing in Old Age

An appropriately designed home provides its residents with a sense of security, privacy, comfort and independence. A home facilitates social interaction with family and friends, provides memories of the past and a sense of continuity in life (Kochera, Straight & Guterbock, 2005). Additionally, a home provides older adults with a sense of identity, particularly if they have lived in the same house for many years (Oswald & Wahl, 2004). These are some of the reasons why older adults wish to remain in their current home for as long as possible (AARP, 2000). Older adults spend about 80% of their time at home (Oswald & Wahl, 2004), they are less likely to move to a new home, and they are more likely to age in place due to their continued home ownership (Quadagno, 2008). It is therefore essential that their housing environments meet their

changing needs. Even if the resident does not have limited mobility, an accessible home allows anyone to visit the home, thereby enabling the resident to maintain critical social ties (Lodl, Gabb, & Combs, 1990; NAHB, 2007b).

In 2007 the World Health Organization (WHO) published a preliminary overview of the LARES (Large analysis and review of European housing and health status) survey which sought to understand the impact existing housing conditions have on one's health, mental and physical well-being. The survey was administered from 2002 to 2003 in eight European cities. Although not specifically focused on housing for older adults, 21% of the participants were over the age of 60. The survey found that for older adults, "the home has a strong meaning and provides them with a sense of control and safety" (WHO, 2007, p. 19), and that those whose housing was of higher quality self-reported better overall health (Figure 1.1). The LARES survey also found that living in inadequate housing can make a person feel as though they cannot control their environment and safety (Table 1.1). Those aged 60 and older showed increased respiratory problems when living in homes with inadequate insulation. Homes that were perceived as cold in the winter showed a higher reporting of arthritis. Additionally, an increased incidence of asthma resulted from homes with inadequate ventilation (WHO, 2007). Although this survey analyzed European cities, the same effects have been found in housing situations in the United States, as will be discussed.

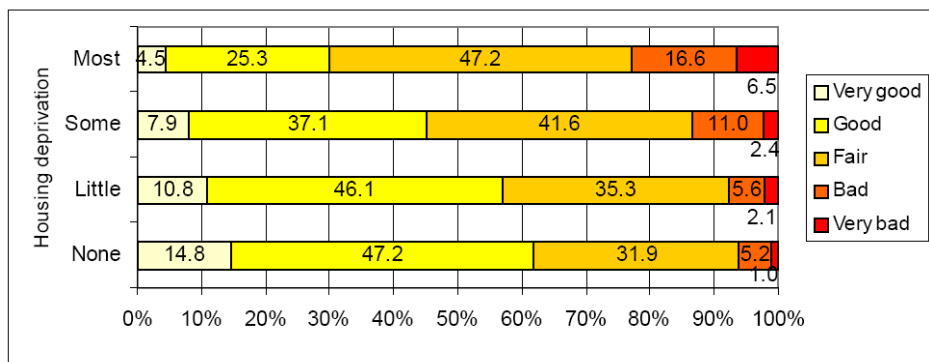


Figure 1.1. Housing quality score and self-reported health status - all households (WHO, 2007, p. 37).

Table 1.1. *Housing quality and psychosocial benefits* (WHO, 2007, p. 19).

Psychosocial benefits	High-quality housing (%)	Low-quality housing(%)
Home means privacy	90	76
Can do what I want	72	62
Feeling of control	77	59
My home feels safe	87	57

Lawton (1989) discusses the concept of environmental press in relation to an older person's competence. Environmental press is the "extent to which an environment demands a response from the person" (Lawton, 1989, p. 63). If an environment is too demanding for an older adult's capabilities, or if it puts too few demands on them, there is a poor fit between the person and their environment (Wacker & Roberto, 2008). Such misfits stem from auditory, neuromotor and musculoskeletal changes, and changes to bones and muscles that occur with age. These changes can influence the ability of an older adult to be successful in navigating their home environment and engage in daily activities (Bakker, 2009).

The relationship between individual competence and environmental press is especially unstable in very old age due to the decreased ability for older adults to adapt to new environments (Oswald et al., 2007). Environmental press can occur if housing hazards are perceived as uncontrollable by the residents (Oswald & Wahl, 2004). If stressful environments produce chronic stress, the residents are at a greater risk of developing life threatening conditions (Dunn, 2002). Furthermore, homes which provide an enabling environment for seniors can bring them to a higher level of functioning and delay or prevent the need for institutionalization. The concept of environmental press further supports the idea that housing environments should be designed specifically for the needs of older adults.

If homes are not originally designed to accommodate older users, modifications should be performed to make the home safer for its residents. Because these alterations can be expensive, there are differences in the ability for people of varying incomes to perform such modifications. There are, however, societal responses to the housing needs for the elderly which help older adults receive the modifications they need. The remainder of this section will discuss these abovementioned issues.

Home modifications.

A properly designed home environment can ensure the health and safety of its residents. Because of natural changes that occur with age, older adults often believe they are not capable of independently carrying out the daily tasks they were once able to perform. Older adults often see themselves, rather than their environment, as the problem, attributing their loss of functional capability to their own impairments rather than to the physical barriers imposed by the environment (AARP, 2000). In order to cope with such a situation, environmental barriers must first be recognized as the source of the problem because “people may lack the knowledge or experience

necessary to eliminate or modify them” (Pearlin & Schooler, 1978, p. 6), and many older adults are unaware of the benefits that home modifications and retrofitting can provide (Oswald & Wahl, 2004).

If home modifications are not implemented, physical obstacles present themselves, making an older adult’s home environment a cause for one’s deteriorating health. The most dangerous hazards for older adults in the home include falls, inadequate lighting, fire hazards, entry to the home by intruders, noise, inadequate provision of food safety, contaminated water, and hazards from excess heat and cold (Oswald & Wahl, 2004). Older adults who live in poor conditions may also be physically and socially isolated because of the obstacles they confront when leaving their home; obstacles such as steps and clutter in the hall could pose tripping hazards (Quadagno, 2008). In 76% of the homes analyzed in the LARES Survey (WHO, 2007), a step was present at the entrance to the home making the residence inaccessible and dangerous for the elderly. Building a ramp to the front door would be the corrective measure. Figure 1.2 illustrates modifications that were implemented, specifically for handicap users, to make the homes more accessible. The LARES Survey concluded that “housing conditions are strongly related to the risk of accidents and injuries” (WHO, 2007, p. 31), including falls, burns and cuts. Similarly in the United States, unintentional falls accounted for 18,807 deaths in 2004, 80% of which were people over the age of 65 (National Safety Council, 2009). Therefore it is imperative for homes to be designed without these tripping hazards and other obstacles.

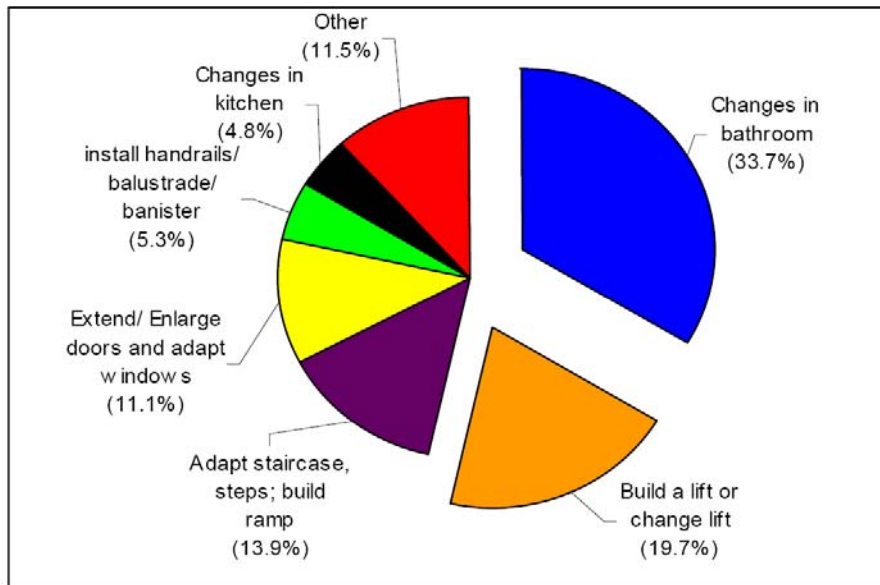


Figure 1.2. Required home modifications in dwellings of handicapped residents (WHO, 2007, p. 30).

Home modifications help maintain the safety of the residents, thereby providing them the ability to live out a healthy lifestyle. Those who fall and suffer moderate to severe injuries reduce their mobility and independence, increasing their risk of premature death. Improving color contrast of furniture and stairs decreases the likelihood of falls, as well as installing handrails on both sides of the stairs. Grab bars in the bathroom, both in the shower and around the toilet, can ease transferring and reduce the risk of falling. Burns in both the bathroom and kitchen can be reduced by installing anti-scald valves on all fixtures to automatically reduce water flow to a trickle when it reaches 120°F. If an older adult can perform tasks in the bathroom independently, their ability to maintain their autonomy and sense of self-worth will be extended (Bakker, 2009).

Overall, home modifications help to improve the quality of life for older adults. Modifications make their daily routines easier to perform, ensuring they are safe in their home, allowing them to age in place. Performing modifications promote

self-care and safe, independent living among the growing elderly population (Quadagno, 2008; Thomson, Thomas, Sellstrom, & Petticrew, 2009).

Affordability issues.

There is a correlation between housing quality and socioeconomic status (SES), as those of lower SES often have poorer quality homes (Figure 1.3) (WHO, 2007). More than 85% of seniors earning less than \$20,000 a year, however, wish to remain in their current residence for as long as possible (AARP, 2000). Although it is difficult for those of lower income to remain in their homes because they may not have the money to make home repairs (Wacker & Roberto, 2008), it has been found that older adults who are living alone and those with lower incomes are more likely to have one or more modifications to their home. Therefore financial resources are not the only predictor of the likelihood of an older adult performing a modification (WHO, 2007).

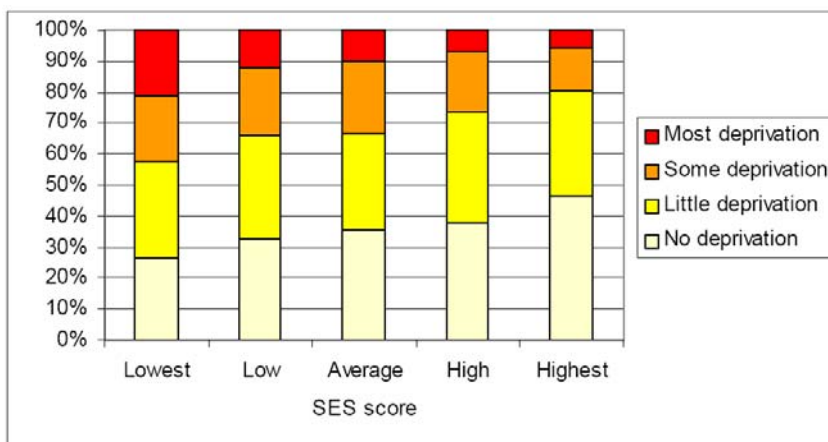


Figure 1.3. Housing quality scores and SES score, all households (WHO, 2007, p. 37).

Older adults with lower incomes often rely on public assistance and government entitlement programs to finance necessary home modifications (NAHB, 2007b). Those who rent their home may endure additional stress because they may

not be allowed to make the modifications necessary for them to age in a safer environment (Hays, 2002). The longer older adults live in stressful circumstances, the greater physiological effects they suffer and the more likely they are to develop health problems (Wilkinson & Marmot, 2003). Additionally, neighborhoods comprised of people with lower incomes may not provide the necessary services needed to assist residents to age in place (Holmes et al., 2003).

In contrast, many older adults have the financial means to make home modifications to improve their health. The baby boomers currently have the highest median income of any age group in the United States as they have earned or inherited more money than any other previous generation (NAHB, 2007b). Those of higher income rely heavily on their earnings and asset income to purchase services and products necessary for home modifications (NAHB, 2007b). For older adults earning more than \$50,000 a year, 76% agree that they wish to stay in their current residence for as long as possible (AARP, 2000). This percentage is less than homeowners who are earning less than \$20,000 a year because affluent individuals have the means to move into retirement communities that provide various health and wellness amenities. Those who can afford to move into service-rich environments and those who have access to support services, are better able to maintain a high quality of life (Holmes et al., 2003).

Societal responses to housing needs for the elderly.

The LARES Survey concluded that there needs to be “improvements of inadequate housing to mitigate social and health inequities within a population” (WHO, 2007, p.38). These improvements should be made for specific housing problems to protect individuals against housing related health effects and injuries. As such, many initiatives exist in the United States which assists the aging community of

all income levels in modifying their homes to make them safer environments to age in place.

In the Older Americans Act reauthorization of 2006, Congress authorized the Community Innovations for Aging in Place Initiative (CIAIP) to provide grants to communities to enable older adults to age in place in their current homes and communities. For example, the New York City Department for the Aging received \$338,575 from the CIAIP initiative to aid an existing NORC (Naturally Occurring Retirement Community) in New York City to improve the health of its residents and guide changes for aging in place models (AoA, 2009).

Recently, the acting Surgeon General Steven K. Galson, issued a ‘Call to Action to Promote Healthy Homes’ (U.S. Department of Health & Human Services, 2009). This Call to Action examines how housing can affect one’s health and hopes to initiate an exchange of ideas about the importance of healthy homes between parents, homebuilders, community leaders and policy makers. Galson stated that “we can prevent many diseases and injuries that result from health hazards in the home by following the simple steps outlined in this *Call to Action*” (U.S. Department of Health & Human Services, 2009, para. 2). Some of the simple recommendations, which relate specifically to the elderly population, include preventing falls by installing grab bars in showers and preparing a fire escape plan.

Organizations, such as Rebuilding Together, assist the elderly, among others, to provide safe and healthy homes, allowing aging homeowners the ability to age in place. Rebuilding Together specifically provides “free home modifications and repairs, making homes safer, more accessible, and more energy efficient” (Rebuilding Together, 2009, para. 2). This organization enables lower income homeowners to receive the modifications they need.

NAHB and AARP developed the Certified Aging-in-Place Specialist (CAPS) certification program to teach professionals (i.e. remodelers, contractors, designers) “the strategies and techniques for designing and building aesthetically enriching, barrier-free living environments” (NAHB, 2009, para.5). These professionals help older adults determine the modifications needed to assist them in their home environment. Although these services may be expensive, CAPS specialists provide consumers with the information they need to make informed decisions that will help them maintain their independence in their own home for a longer period of time.

Overall, a safe living environment can have a great impact on one’s health, especially in old age. A greater number of housing options for older adults are becoming available because of the changing demographics, as will be discussed in the next section.

Emerging Trends in Senior Housing

Since the size of the U.S. population aged 65 and older is rapidly increasing, there is an increase in demand for homes that meet the needs of this population (NAHB, 2007b). With this in mind, architects and designers are designing new homes and performing modifications to older homes that support the abilities of older adults (Oswald & Wahl, 2004). As previously stated, AARP (2000) concluded that older adults wish to stay in their homes for as long as possible, yet this is not a feasible option for some seniors. Other environments can mimic the positive attributes a private home provides. However, throughout history, housing for older adults has not met the needs of this population and their changing abilities.

Historically, seniors in the United States were housed with criminals, orphans and the mentally ill. It was not until the late 1880s that planned retirement communities emerged, beginning with The William Enston Home in Charleston, South Carolina. The onset of the Social Security Act in 1935 assisted in establishing

for-profit nursing homes. While private nursing homes started to exist in the 1950s, the conditions inside these homes were often poor. A turning point in senior housing occurred in 1961 when the first Conference on Aging was held. This conference unveiled Freedom House, a house that was built especially for the needs of the elderly. Concepts from this design eventually become the foundation for the principles of universal design (Dickinson, 2008).

Baby boomers are beginning to move into retirement communities; however, their wants and needs are different than previous generations. “If there’s anything that baby boomers don’t want, it’s to wither away in a conventional nursing home” (Dickinson, 2008, p. 71). Lazarowich (1991b) comments on the effects of institutionalization.

. . . in recent years sociologists and psychologist have found that institutionalization can have negative psychological effects on the elderly. In fact, for some elderly persons the psychological stress of entering an institution may be fatal... governments within the last few years have encouraged the establishment of community based services which permit the elderly to remain a part of the community for a longer period of time. (p. ix)

Therefore, seniors need to be provided with different housing options in addition to the traditional institutional-like settings, such as nursing homes. As Lazarowich (1991b) stated, it is important to find a housing option which allow the residents to remain part of their community.

As a result, Continuing Care Retirement Communities (CCRCs) gained popularity in the 1990s. These facilities provide three levels of care on the same campus: independent living, assisted living, and skilled nursing care. This enables residents to age in place; once a resident moves to a CCRC, they intend on staying there for the rest of their lives. CCRCs require an up-front fee which can be between

\$25,000-\$35,000 or as high as \$500,000, and monthly fees which range between \$1,500-\$2,500 and \$3,500-\$5,000. Monthly fees cover the cost of rent, utilities, one meal a day, health clinic, and transportation (Quadagno, 2008). Due to these high costs, only those who can afford to live in this type of a facility can do so. CCRCs are beginning to resemble five-star hotels and health resorts rather than senior facilities. They provide a variety of dining options and have many amenities including spas, all of which are located on the CCRC campus so the residents can access what they need without having to go very far (Dickinson, 2008). Many CCRCs have associations with local universities allowing residents to attend university classes, sporting events and lecturers. In return, university students have internship opportunities at the CCRC or can receive mentoring from the residents (Carle, 2010). Similar to the elder cottage, CCRCs enable older adults to age in place and receive the care they need without moving to an institutional setting, which as Lazarowich states, could be fatal.

While CCRCs are gaining popularity, smaller residential settings also exist. One such environment is the Green House, a concept developed by Bill Thomas:

We envision homes in every community where elders and others enjoy excellent quality of life and quality of care; where they, their families, and the staff engage in meaningful relationships built on equality, empowerment, and mutual respect; where people want to live and work; and where all are protected, sustained, and nurtured without regard to the ability to pay. (NCB Capital Impact, n.d., para. 2)

The Green House is meant to resemble a home rather than an institutional setting. It is a place where seniors can live a “full and interactive life” (Thomas, 2010, para. 1). Eight to ten seniors live in each Green House with each resident having their own private room and bathroom. The Green House blends in with its neighboring community and is warm, smart and green: warmth in the floor plan, furnishings, and people; smart in the use of “smart technology-computers, wireless pagers, electronic

ceiling lifts and adaptive devices”; green in the amount of ”sunlight, plants and access to outdoor space” (NCB Capital Impact, n.d., para. 3). The Green House is similar in concept to the elder cottages as they both provide small residential settings that allow older adults to maintain their sense of identity and the ability to live an independent lifestyle.

Mixed-use communities are increasing in popularity as well. These are intergenerational communities which provide interaction among all generations. For example, once such complex incorporates a day care center, day school, summer camp, community center, and housing for seniors (Dickinson, 2008). There are benefits for all ages in this type of a community. Families and children benefit as they remain physically close to their extended family and learn from their elders. Similarly, seniors obtain support in performing ADLs and IADLs from others living in the same community. Seniors remain useful throughout their life by sharing their life stories and experiences with younger generations. Because of the different levels of care provided in one community, a senior can receive higher levels of care without leaving their neighborhood. Additionally, these communities change the attitudes and acceptance of younger generations towards seniors (Troyer & Troyer, 2010). Mixed-use communities and elder cottages both allow for intergenerational living, an arrangement that is beneficial for all generations.

Another intergenerational approach on a smaller scale is an accessory dwelling unit (ADU). An ADU is an “extra living unit on your property, complete with kitchen, bathroom and sleeping facilities” (A Regional Coalition for Housing, 2009, para. 1). ADUs, also known as accessory cottages, granny flats, mother-in-law apartment, and secondary units, among others, will be further discussed in this thesis.

One type of ADU was recently developed by Kenneth Dupin (N2Care, n.d.a). While traveling the world in 2005, he realized that elders in other countries were

treated differently than in the United States. Other countries revere the elderly rather than cast them aside. He therefore developed the MEDCottage, “an alternate solution for our society that would be emotionally satisfying yet affordable ... with products designed to provide solutions that work with our unique culture while alleviating the concerns of aging seniors” (N2Care, 2010a, para. 4). He describes the MEDCottage as a “modular home that can easily be placed on a homeowner’s property (N2Care, 2010b, para. 1). “It maintains elements of a comfortable home, using the space efficiently to create sleeping, living and bathing areas, but is equipped with the latest technical advances in the industry to assist with care-giving duties” (N2Care, 2010b, para. 2). These cottages provide internet cameras (web cams) and voice communications, movement locators, medicine consumption monitoring, air filtration, hazardous waste disposal, and other environmental protections. By installing a MEDCottage, some of the burden on the caregiver is relieved because of the technology built into the cottage. This is an innovative approach to caregiving, allowing a loved one to remain close to family during the end of life while still receiving medical assistance.

As shown, there is currently a wide variety of housing options available for older adults. Accessory dwelling units, specifically elder cottages, will be the focus of the remainder of this thesis. This housing option is beneficial for older adults who want to remain a part of the community, live among different generations and reside in their own home rather than in an institutional setting, similar to the trends in senior housing options previously presented. The history of ADUs throughout the world, discussed in the next section, form the basis of the ECHO program in the United States.

International Granny Flat History

As previously stated, a granny flat is a type of accessory dwelling unit specifically addressing the needs of the elderly population. The granny flat concept was first developed in Australia and then adopted by other countries throughout the world, including the United States. The history of the granny flat programs in Australia, New Zealand and Canada are discussed in this section, detailing the history and current position of each program. The granny flat program in Australia influenced the development of the ECHO program, specifically in Tompkins County, New York.

Australia.

The concept of the granny flat, also known in Australia as a movable unit, began in Victoria, Australia in 1972. The then Housing Commission of Victoria, currently the Department of Human Services, Division of Housing and Community Building, developed a new way for families to care for their elderly parents. Amendments to the Housing Act of 1983 (Housing Act 1983, 2010) allowed the Australian Ministry to construct temporary second dwellings beside or attached to an existing residence beginning in 1975. Specifically, a movable unit is “a building or structure capable of accommodating not more than two persons and of being transferred from place to place” (Power, 1991, p. 2). In the first 14 years in which movable units were permitted, 2,140 units were located in the Melbourne area (Lazarowich, 1991b).

Movable units existed to “make available to pensioners self-contained accommodation which would enable them to live independently but in close proximity to their family” (Power, 1991, p. 2). The Ministry paid the initial construction costs except those having to do with upgrading existing services, such as sewage and electric. The rent for a unit was about 20% of the resident’s income. The units could be relocated throughout the state as they were owned by the Ministry rather than by

local governments. As such, units could be relocated across local government boundaries, and could therefore be used by new residents rather than sitting vacant (Power, 1991).

In 1977, the Australian Ministry established a Private Funded Program allowing occupants to finance the construction of their own unit if they had the financial means. This enabled residents to move into the units faster as they bought the unit themselves and therefore did not have to wait for one to become available through the Ministry program. While the resident paid the construction costs, the Ministry owned the unit. Therefore, when the unit was no longer needed it could be rented out to another resident. This option became less popular as the purchase price increased due to rising basic unit and transfer costs (Power, 1991).

When the movable unit program first began, there were two main floor plans for the units in Victoria; one square and one rectangular. Although varying slightly, all units contained a living room, bedroom, kitchen and bathroom. The program placed units throughout Australia, but because climatic conditions were specific to a dry Australian climate, the units could not necessarily be used in other parts of the world. All units were built with panelized construction and were supported by square hardwood or concrete stumps. By 1985, eighteen different units were supplied by twelve different contractors. They varied in their materials and construction methods; however, some were not as successful as others. Eventually, a new rectangular standard unit was created, unless the site did not permit, in which case square units were still available. They continued the use of 1.2m X 2.8m panels because they were easy to dismantle and to carry through narrow spaces (Power, 1991).

Currently, the State Government of Victoria, Australia, Department of Human Services administers the movable unit program. Their website states that a movable unit may be the right choice “if you want to keep living independently while staying in

close contact with your family or friends” (Executive Director of Housing & Community Building, 2010, para. 1). Once an application is approved, there is usually a three to six month waiting period before the unit is placed on the property. Each unit has a bedroom, bathroom, living room and kitchen with a stove, heater and hot water. Vinyl flooring is found in the bathroom and kitchen. All units are previously used and refurbished when moved from one site to another (Executive Director of Housing & Community building, 2010). As of June 30, 2009, a total of 1,559 movable units existed in Australia (Department of Human Services, 2010). Similar programs exist throughout the world due to the success of the Australian program.

New Zealand.

The New Zealand government began housing programs specifically for the elderly in the 1950s by providing funds for local authorities to build rental properties. In the 1970s, the Commission of Inquiry into Housing established the granny flat program to better meet the housing needs of older adults (Chalmers & Hall, 1991). In August 1980, the National Party approved granny flats and their construction was financed by local authorities through the Housing Corporation. Because of limited funding, only 43 flats were placed in the first three years of the program. Therefore, in 1986, the Housing Corporation decided to operate the program instead of the local authorities. In turn, by 1988, 239 units were placed through the program.

One of the major difficulties with this program, even today, is the high cost to produce new units. Since the program is small scaled, there is low demand for the units, making it expensive to produce each one individually. Additionally, the cost of the units varies from region to region. Network Building Systems is one company who nationally supplies buildings of modular construction which can be relocated. Although there are problems with the funding of the program, most residents are very

satisfied with the program, and enjoy being close to their families (Chalmers & Hall, 1991).

Canada.

The Canada Mortgage and Housing Corporation, in conjunction with the Ontario Ministry of Housing, introduced the granny flat concept to Canada in 1984. In Canada, granny flats are also referred to as garden suites or Portable Living Units for Seniors (PLUS). They are defined as a “small, detached, self-contained, movable house with all the amenities for one or two persons and is located on the property of a relative or another person” (Lazarowich, 1991a, p. 31). From 1985 through 1988, the cities of Waterloo, Ottawa-Carleton and Sudbury sponsored PLUS programs. Similar to the New Zealand program, the units were expensive to produce due to low demand. The design of the units met the needs of the residents, and its modular construction allowed the units to perform well (Lazarowich, 1991a). After a demonstration project in 1989 in which 12 garden suites were installed by the Ontario Ministry of Housing, it was found that this type of housing would be beneficial for those who wished to remain independent and receive support from the host family (Canada Mortgage and Housing Corporation, 2010). Garden suites continue to exist in Canada today as a program sponsored by the Canada Mortgage and Housing Corporation.

As discussed, international granny flat programs have provided housing for a specific portion of the elderly population. Similarly, in the United States, ECHO units allow older adults to remain independent in a safe environment close to their family.

ECHO History in the United States

Influenced by the Australian program, AARP held a forum in 1981 to discuss granny flats as a housing option for older adults in the United States. As a result, AARP and the media publicized the concept, eventually leading to the development of the Elder Cottage Housing Opportunity (ECHO) program in the United States (Hare,

1991). AARP founded the ECHO program on the ideal that housing should provide a safe and convenient environment for income eligible seniors aged 60 and older who can no longer live independently in their own home. A small modular home placed next to the home of the senior's adult child allows the older adult to maintain independent while still receiving every day support and security from their nearby family. As stated in the case *Moore v. East Cleveland* (*Moore v. East Cleveland*, 431 U.S. 494, 1977), "living with (or close to) one's extended family is a substantive due process right which is constitutionally guaranteed" (AARP, 1991). Although residents have to first move into the cottage, once there, they hope to age in place and remain in the cottage for the rest of their lives, or until they require higher levels of care (AARP, 2000). This type of housing provides an overall improvement in life quality, "whether they are older people in need of support, adult children, or grandchildren" (AARP, 1991, p. 3).

In the United States, the elder cottage concept existed before it was formally introduced by AARP. For example, in the Amish community, the elderly normally live in an apartment in a home of one of their children, called a *Grossdawdy Haus*, a small adjacent house. The elderly share their life wisdom with the rest of the family and the family can assist their elders in their daily tasks. "Surrounded by droves of grandchildren, they pass on the wisdom, joys, and secrets of Amish life to the rising generation" (Elizabethtown College, 2010, para. 5). A similar concept existed in Frederick County, Maryland in 1977. This county allowed for the placement of mobile homes in its agricultural area so that older family members of local homeowners could live in close proximity. Although the mobile homes in this case were not necessarily an appropriate housing choice because of their lack of age and mobility appropriate features, this was the most successful program similar to ECHO

housing in the United States in 1989, as there were 38 units located in Frederick County (Hare, 1991).

Additionally, accessory dwelling units (ADUs) also existed. Similar to ECHO units, ADUs are homes, either attached or detached from the main home, which houses an older relative, caregiver, or renter (Chapman & Howe 2001). ADUs also allow older adults to live in close proximity to their families, providing a symbiotic relationship among the generations. They allow seniors to age in place only if the actual design of the unit allows the resident to do so. It is argued that ADUs need to be initially designed incorporating the principles of universal design. By doing so, the transition between the two life stages, “independence and assisted independence,” would be less distressing because the unit would meet the current and future needs of the residents (Antoninetti, 2008, p. 366).

In the early 1980s, individual programs publicized ECHO housing. One was in Iowa, where funding was spent on creating a demonstration unit and therefore could not continue with the program. Around the same time, the elderly population in New York State gained interest in ECHO housing, in turn creating a demand for changes in zoning regulations and production of the units. Ed Guion, a specialist in product development in housing, produced ECHO units through his company, Coastal Colony Corporation around this time as well. His units were built in factories but were stick-built similar to the way a regular home would be constructed. Therefore the units blend in with the surrounding traditional homes, and they can “by-pass local restrictions against mobile homes” (Hare, 1991, p. 59).

To date, ECHO housing in the U.S. provides benefits including privacy with proximity and low cost. The low cost is a result of using small and factory built units. Additionally, since the monthly cost of living in a cottage is less than maintaining a

regular sized home, the residents have more income to spend on other needs in addition to their housing needs (Hare, 1991).

A major obstacle in the development of ECHO housing in the United States is zoning. Hare (1991) outlines this issue:

Zoning amendments to permit echo housing should require echo housing to conform to the style of the home it is placed next to, to be temporary and removable, to conform to standards that insure it is appropriate for use by frail and disabled persons, and to insure it can withstand repeated moves. (p. 61)

Because the local government owns the cottages, the unoccupied ones are promptly removed and transported to where it is needed, whereas a homeowner may take longer to remove the unit. It is important for the government agencies who own the cottages to have zoning approvals so the cottages can be rapidly approved and placed.

Although zoning can be problematic, in most cases it has not prohibited the development of ECHO units, especially if the units are temporary (Hare, 1991).

It can be inferred that the number of ECHO units should increase in the future because of the growing need for affordable and accessible housing alternatives for older adults. Prior studies show that “residents using Elder Cottages reported significantly greater satisfaction with their housing, increased independence, more telephone contacts with friends and family, improved relationships with hosts [those living in the main house], more accessible housing, and less formal service use” than before moving into the cottage (Altus, Xaverius, Mathews, & Kosloski, 2002, p. 134). Additionally, the host families were satisfied with the seniors’ housing and less stressed in their caregiving roles. While elder cottages may provide these benefits, ECHO effectiveness would not occur in the United States without government assistance with the development of the program and the purchasing, installation and maintenance of the units (Altus, et al., 2002).

Better Housing for Tompkins County's ECHO Program History

From 1990 to 2000, the population over age 75 in New York State increased 15.4%, and the population over 85 years of age increased 25.5%. Currently, New York State has the third largest elderly population at 3.4 million (New York State Office for the Aging, 2009). While NYS has seen an out-migration among young adults (aged 20-34) and young-elderly (aged 55-74), there has been an in-migration of the oldest population (80 years and older). The majority of these individuals are those who move to New York to live near family in their later years of life (New York State Office for the Aging, 2009). Additionally, many older adults in New York live below the poverty line (\$10,210 per year): 8% of women and 4% of men aged 60-79, and for those 85 and older, 12% of women and 4% of men (Wacker & Roberto, 2008). Older adults are vulnerable to increasing home costs, and they may be forced to leave their communities and break their social ties if they can no longer afford their housing (NAHB, 2007b). The older adults moving to New York State to be closer to their families need to be provided with affordable housing options.

This need is apparent in Tompkins County, New York. Tompkins County is located in central New York (Figure 1.4), and is divided into nine towns: Caroline, Danby, Dryden, Enfield, Groton, Ithaca, Lansing, Newfield, and Ulysses (Figure 1.5). As of 2009, 10.4% of the population in Tompkins County was over the age of 65 (U.S. Census Bureau, 2010).



Figure 1.4. Map of New York State highlighting Tompkins County (Benbennick, 2006).

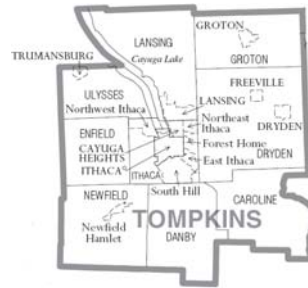


Figure 1.5. Map of Tompkins County (Blah42, 2007).

Program history.

Tompkins County provides many safe and affordable housing alternatives for the growing senior population such as ECHO units. In 1985, the Cooperative Extension Corporation received a grant from New York State to assist in the establishment of a HOST (Housing Options for Seniors Today) program within individual counties in the state (D. Stoyell, personal communication, May 19, 2010). The HOST program provided new and innovative housing alternatives for those wishing to age in place, including match-up home sharing, shared living residences, accessory apartments, home equity conversion, and ECHO units. The ECHO units addressed the needs of a specific group of the elderly population by providing affordable housing where seniors can live independently while receiving support and security from their nearby family (Cornell University, 1986).

In the early 1990s, the Tompkins County Office for the Aging (COFA) gained control of the ECHO program from the Cooperative Extension Corporation. COFA lobbied local municipalities to allow elder cottages in single family zoned areas. In addition, workshops educated local seniors about the HOST program in hopes to earn their acceptance. Of those who attended the workshops, the majority did not have any objections to the ECHO program on the condition that the structures are removed once

they were no longer occupied, and that the units did not look like mobile homes, rather that they fit in with the character of the existing area. While the program piqued interest in the community, the ECHO program only met the needs of a niche market. As an intergenerational program, ECHO units allow multiple generations to live together on one site. Not everyone wants to live next to their son or daughter or next to their mother or father; however, for those who do, it was a very enticing program (D. Stoyell, personal communication, May 19, 2010).

By the mid-1990s, the town of Ithaca, followed by the town of Dryden, passed a permissive permit process. COFA concluded that only a variance was necessary to place the units in single family zoned areas as long as the cottages were for temporary use. If the neighbors objected, however, a special permit would be required. This increased ECHO acceptance as the cottages would be temporary and would not have long term effects on the neighborhood character or property value (D. Stoyell, personal communication, May 19, 2010).

Better Housing for Tompkins County (BHTC) became interested in the ECHO program and decided to collaborate with COFA. Formed in 1981, BHTC is a non-profit organization which works “to develop and improve housing opportunities for low and moderate income individuals, families, older people and the disabled in rural Tompkins County” (BHTC, 2009a, para. 1). BHTC “is dedicated to increasing sustainable, secure and affordable housing options for rural residents through construction, education and advocacy” (BHTC, 2009c, p. 4). As a result of the partnership between BHTC and COFA, BHTC maintains the program while COFA aids in the application process and gets potential residents interested in the program.

In 1994, the New York State Department of Housing and Community Renewal and the federal HOME program, a program used to create affordable housing for low-income households, granted BHTC \$340,000 for the purchase of six elder cottages

(Pollak, 1999). The U.S. Department of Housing and Urban Development describes HOME as “the largest Federal block grant to State and local governments designed exclusively to create affordable housing for low-income households” (2010, para. 4). While there was funding for six cottages, only five were purchased because that was the demand at the time (D. Stoyell, personal communication, May 19, 2010).

In 1998, BHTC began the ECHO program, the first housing option of its kind to exist in New York State (BHTC, 2009d). The website for BHTC describes the program:

Better Housing rents small modular homes to income eligible seniors who wish to have them installed temporarily next to the family home of their adult children or other supportive relatives or friends. The **Elder Cottage** [emphasis included in original text] concept enables seniors who are no longer able to maintain a home alone to continue living independently with the support and security offered by family living in the main house.

The accessibility and other design features built into the house also help the senior occupant(s) to remain independent as long as possible. These modular homes are placed on pressure treated timber foundation that can be cut off at ground level when it is time for the elder cottage to be moved by Better Housing to a new location. (BHTC, 2009d, para. 1-2)

COFA sends information about the ECHO units to those who inquire about the program. The COFA program coordinator speaks with the host family and the potential resident before a pre-application is submitted. There are many variables in deciding whether or not an elder cottage is an appropriate choice for a particular senior. The resident needs to be age and income eligible. In addition, zoning, compatibility with the host family, and site are also considerations for the ECHO program. If the potential resident appears to be eligible, BHTC sends their

construction coordinator to the site to approve the location. Additionally, the resident's physician needs to assure that the resident will be in good health for the next several years. In the event that the cottage needs to be moved within three years, the homeowner has to pay the moving costs, as stated in the original contract. If the site is approved and the resident appears to be eligible, the resident gets placed on the waiting list (D. Stoyell, personal communication, May 19, 2010).

Generally speaking, the waiting list is not long. Timing is what hinders residents from being moved into the cottages. Often, potential residents sign up when they would like to get the cottage but one is not available. An individual can wait approximately six months to five years to get off the waiting list, a long time for those who are generally in their 70s. Some potential residents are removed from the waiting list for various reasons, including relocation or health problems. The Aging Services Specialist at COFA in charge of the elder cottage program occasionally contacts those currently on the wait list to ensure that they are still eligible for a cottage (D. Stoyell, personal communication, May 19, 2010).

In 1998, after the first cottages were placed, Tompkins Community Action (TCA) collaborated with COFA in assisting residents obtain a Section 8 subsidy, a requirement in being eligible for the elder cottage program (D. Stoyell, personal communication, May 19, 2010). Section 8 "provides rental subsidies to income-eligible individuals and households. Participants generally pay between 30-40% of their monthly adjusted income towards their housing cost and the remainder is directly paid to the landlord" (TCA, 2010, para. 1). Therefore, the rent for the elder cottages is adjusted to the resident's income, and the Section 8 program pays for the difference in rent. Subsidized rent provided by the HUD (U.S. Department of Housing and Urban Development) Section 8 rental assistance program helps to create affordable housing. While the costs of living in the cottages are affordable for the residents, the high cost

associated with the elder cottage program is in the transportation of the units from one site to another.

Current position of BHTC ECHO program.

While BHTC's ECHO program currently has five occupied cottages, the financial viability of the program is in jeopardy. The cost of moving the cottages has greatly surpassed its original cost estimate. In 1997 it was believed that each move would cost around \$10,000. Today, however, this cost is between \$35,000 and \$45,000 per move. Therefore, the program is running out of money to move the cottages. When BHTC received the grant money, they agreed to a 20 year regulatory period, 1997 to 2017. Since there is currently only enough funding to allow for one more cottage to be relocated, it is unclear if the money for the program will deplete before the end of the regulatory period. BHTC is actively working with the New York State Division of Housing and Community Renewal (DHCR) to change the amendment requiring a regulatory period (A. Piliero, personal communication, May, 12, 2010). Additionally, BHTC anticipated there would be a high turnover rate and the cottages would be moved more often than what actually occurred. Since BHTC placed the first cottage about 13 years ago (c. 1997), only three of the cottages have been moved (D. Stoyell, personal communication, May 19, 2010).

The current Strategic Plan for BHTC states that by 2012 the ECHO program should be evaluated to review its financial viability and to decide on the future of the program. The Strategic Plan points out the strengths, weaknesses, opportunities and threats for the program (Appendix A). It discusses the expense in moving the cottages which are not built to move, and that the cottages themselves are aging. BHTC hopes to decide on the future of the program in terms of program modifications and a cost/benefit analysis (BHTC, 2009c, p. 27).

Site description.

In developing the design of BHTC's ECHO units, Ed Guion's elder cottages in Pennsylvania were used as a guideline. Designers made alterations to the original floor plan to meet New York State design standards (D. Stoyell, personal communication, May 19, 2010). The New York State Division of Housing and Community Renewal and the New York State Housing Trust Fund Corporation developed a Design Handbook which creates "minimum housing standards for persons in low-income and to assist project sponsors and architects in creating functional, safe, durable and cost-effective projects" (Office of Community Development [OCD], 2008, p. 1).

The cottage is a one bedroom, ranch-style modular home measuring twenty-three feet eight inches by twenty-eight feet (23'-8" X 28'-0") and is approximately 660 square feet. Its foundation is pressure treated timber and its siding is vinyl. The cottage is heated through baseboard electric and propane, and the water and sewage is hooked into the well and septic system of the main home on the site. The cottages are pre-equipped with all appliances, carpeting, cabinets and counter tops (BHTC, 2009d). The cottage, constructed as a modular home, is brought to the site in two pieces, where it is assembled (Figure 1.6).



Figure 1.6. Installation of elder cottage on site (BHTC, 2009b; Piliero, personal communication).

Each cottage has two entrances: one accessible from a ramp, and one from a flight of four steps. The resident decides at which entrance they would like the ramp and the stairs to be located. Therefore not all of the cottages currently have the same outside entrance configuration. As stated on the BHTC website, the cottages meet NYS senior housing specifications as there is a ramp at one entrance, and door sizes and clearances allow wheelchair access to the entire cottage (BHTC, 2009d). The house is divided into four rooms: living room, kitchen/dining room, bedroom and bathroom (Figure 1.7) (for detailed floor plan, see Appendix B).

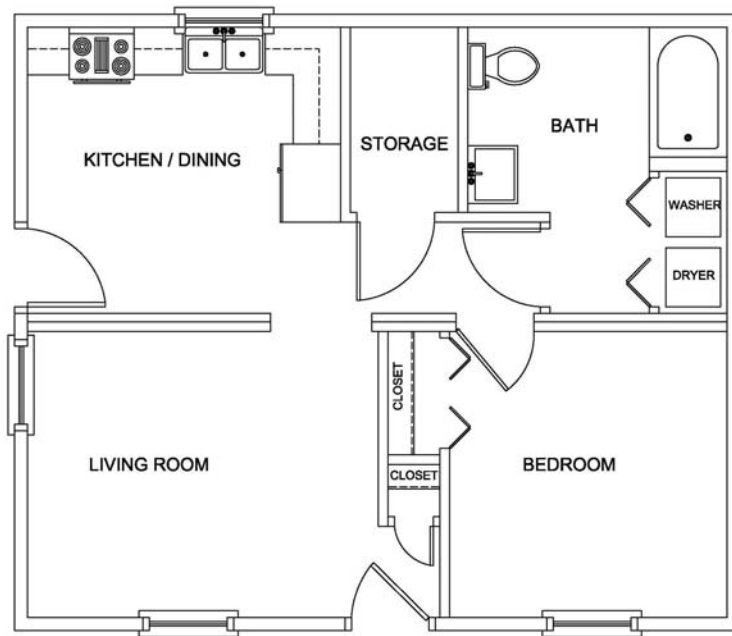


Figure 1.7. Floor plan of BHTC's elder cottage (adaptation from Piliero, personal communication).

The living room measures approximately thirteen and a half feet by eleven feet ten inches (13'-6" X 11'-10"). There is a door to the outside and two windows in this space, providing natural sunlight and views to the outside. Within the living room is a small coat closet. The living room can serve multiple functions depending upon how the resident wants to use the space, either for entertaining, relaxation or both.

The kitchen/dining room is accessible from the side entrance as well as from the living room. It measures twelve foot one inch by eleven foot ten inches (12'-1" X 11'-10"). The kitchen is equipped with an electric range, refrigerator, and sink. The sink has open space underneath, allowing a wheelchair user to wheel under the sink. Additionally, there is a window located directly above the sink. There are both upper and lower cabinets, as well as a Lazy Susan in the lower corner cabinet.

The bedroom is a private space in the cottage measuring approximately ten foot eight inches by eleven foot ten inches (10'-8" X 11'-10"). There is a window in

this space looking out to the front of the cottage. Within the bedroom is a large closet concealed behind bi-fold doors. The bedroom allows the resident privacy, even when others are in the cottage.

The bathroom is accessible from the main hallway, allowing it to be used by both the resident and visitors. There is space within the bathroom for a wheelchair to easily maneuver, as there is a five foot (5'-0") turning diameter. The sink is hung from the wall allowing the resident to wheel up to the sink if the resident is a wheelchair user. The cottage comes with a bathtub equipped with two grab bars on the side wall, one on the back wall and one on the front wall along with a vertical glide rail for height adjustment of the shower head. There is also a fold up seat on the back wall (Figure 1.8). There is a closet behind accordion doors located within the bathroom. This closet comes equipped with the hookups for a washer and dryer; however, not all of the residents decided to install a washer and dryer in this closet.

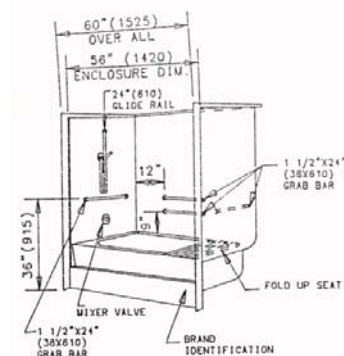


Figure 1.8. Diagram of original bathtub in elder cottage (Piliero, personal communication).

A small closet in the hallway connecting the kitchen to the bathroom contains the water heater. The residents use this closet as an additional space for loose items.

The units used in BHTC's elder cottage program enable the residents to live independently yet close to their families. Specifically, the design of the cottage will be discussed in detail later on in this thesis.

Research Questions

Based on BHTC's Strategic Plan, the objective of this research is to evaluate the design of BHTC's current ECHO unit, and propose suggestions for a new design. As stated, research has not extensively evaluated the design of ECHO units. Research published on elder cottages or similar structures focus on other aspects of the program besides its design. For example, Koebel, Beamish, Daniels-Lang, and Steevens (2003) prepared an evaluation of the ECHO program for the U.S. Department of Housing and Urban Development which focused on zoning, land use and affordability; it did not discuss the design of the cottage. Therefore, this study will fill the gap in previous ECHO research by using interviews and observations to discuss the design of BHTC's elder cottages. Moreover, design recommendations will be proposed for the elder cottages which utilize the findings of the research and incorporates the principles of universal design.

Method

Research Design

The methodology of this research is a case study. Within the framework of the literature review, it is an in-depth look at a group of individuals who participate in Better Housing for Tompkins County's Elder Cottage program. Before receiving the names and contact information for the participants, this study was approved by, and conducted within the guidelines of the Institutional Review Board (IRB) for Human Participants from Cornell University (Appendix C). Overall, the findings of this case study can be generalized beyond the elder cottages found in Tompkins County as the design recommendations are best practices for housing design for the elderly.

Participants

The participants in this study are the current residents of BHTC's elder cottage program. The Property Manager at BHTC in 2009 provided the names, addresses and phone numbers of all of the current residents at the time this research was conducted. The researcher sent a letter to each resident informing them of the research intentions and asking for their participation (Appendix D). After sending the letter, the researcher called each participant to confirm the residents' willingness to participate and to answer any questions they may have. Four out of the five residents are included in this study ($n = 4$). The fifth resident was not included in the study as this resident was in the process of relocating during the time this study was performed. The participants' ages range from 75 to 81 and their residency duration in their cottage ranged from 9 months to 13 years at the time of the interviews. Their family members who live in the main house on the property were also participants. In one case, the family members interviewed were not those living in the main house, however they lived only a few miles apart. The family members who participated are further discussed in the following chapter. After interviewing each resident, the researcher

contacted their family via email or phone. The researcher interviewed six family members in total. All participants signed a consent form before beginning the research process (Appendix E). Participating residents received \$50 in cash for their cooperation in this study. The names of the residents and their family members are confidential; therefore, residents will be referred to as residents A, B, C, and D.

Site Selection

The elder cottage program in Tompkins County provided the researcher with a convenient location to study these cottages because of their close proximity to Cornell University. The researcher visited each cottage as they were all within driving distance.

Information Gathering Procedure

As evident in the Introduction, the researcher performed a literature review to learn the history of the ECHO program in the United States and specifically in Tompkins County, New York. The researcher conducted interviews with key individuals involved in the development and execution of the ECHO program, including: Andrew Piliero, Property Manager at Better Housing for Tompkins County; David Stoyell, Aging Services Specialist at Tompkins County Office for the Aging; and Pat Pollak, former Policy Analysis and Management professor at Cornell University, an individual who played an instrumental role in the inception of the ECHO program. The builders of the cottage, Integrity Building Systems in Pennsylvania, and MSI: Modular Structures of PA, Inc. were contacted and responded to the researcher's questions.

The researcher made three visits to each cottage after the residents confirmed their willingness to participate in this study. The first visit consisted of interviews with the residents and performing preliminary observations of the cottage, the second consisted of interviews with family members, and the third consisted of making formal

observations of the cottage. The researcher conducted the resident interviews and formal observations in the cottages while the family interviews occurred in the main home. All visits occurred during the months of May and June 2010 (for the dates of each visit, see Appendix F).

Interviews with the residents and their family members consisted of open-ended questions with the intention of creating an open dialogue and conversation with the participants. Questions focused on the accessibility, affordability, and structural stability of the cottage as well as the cottage's ability to support social interaction, activities of daily living (ADLs) and instrumental activities of daily living (IADLs) (for complete interview scripts, see Appendix G). Additionally, the researcher phrased the questions in order to determine the advantages and disadvantages the cottage design has on the health and overall well being of the residents. These interviews were voice recorded, with the participants' permission as per the consent form, to accurately transcribe their comments.

The guide used for performing formal observations was the GEM (Gerontological Environmental Modifications) assessment developed by Rosemary Bakker at Weill Medical College of Cornell University, Division of Geriatrics and Gerontology (see Appendix H). This is a home assessment tool used to identify problems and possible solutions for each room of the home. The GEM is divided into different areas including the living room, bedroom, hallway, bathroom, kitchen and outdoors, and covers a broad range of environmental features including accessibility, furniture, lighting, flooring among others. Using an established tool allows the researcher to make consistent and structured observations at each cottage. The researcher took photographs at each cottage, with the participant's permission, as signed off on the consent form.

Information Analysis Procedure

Through the literature review, preliminary research, and the structuring of the interview questions, seven main issues are used to help categorize and organize the procedure and findings of this study. The seven areas are: accessibility, ability to support social interaction/quality of life, ability to support activities of daily living (ADLs) and instrumental activities of daily living (IADLs), affordability, sustainability, transportability/structural stability, and zoning regulations. This research design allowed for a proper evaluation of the current cottage design to make design recommendations for a new cottage design. These categories serve as the framework for the remainder of this thesis in both the Results and Discussion sections.

Results

The results are organized in two sections: 1) resident profiles and 2) presentation and analysis of the main issues. The resident profiles are a compilation of the interviews with the cottage residents, their families, and formal observations made by the researcher. Next, the seven main issues are addressed: accessibility, ability to support social interaction/quality of life, ability to support activities of daily living (ADLs) and instrumental activities of daily living (IADLs), affordability, sustainability, transportability/structural stability, and zoning regulations. Results come from interviews, observations, and the literature review. The photographs found in this section were taken by the researcher (Lichtman, 2010) unless otherwise noted.

Resident Profiles

The following resident profiles are brief introductions to each resident. Profiles include their age, length of time living in the cottage and additional background information, including why they originally moved into the cottage. The main issues they each addressed during the interviews are discussed, as well as the researcher's observations of how the cottage meets, or does not meet, each of their varying needs. Since each of the four residents come from different backgrounds and have lived in the cottages for varying lengths of time, each one addressed different issues they have encountered.

Resident A.

At the time this research was conducted, resident A was 80 years old and had been living in her cottage for thirteen years. She was the first resident to move into an elder cottage through the BHTC program. Originally from the Buffalo area, she moved to Troy, New York before settling in the Ithaca area. She previously did not live near her family. Therefore, the cottage allowed her to live close to her family which "means a great deal" to her; she pointed out that now she needs her "family

more than ever.” Her cottage is located on the property of her oldest son and his family. Her son added that, “It just seemed that she would be better living closer to family and that is what she wanted. It’s been great having her here.” The resident suffers from epilepsy as well as osteoporosis, which has caused her to have had several broken bones in recent years. Because of her limited mobility, she usually remains inside of her house; as resident A stated, “I can’t go down the stairs well. So I stay at home.” In the past she had to use a wheelchair in the cottage; however, she currently only needs the use of a walker to get around the house.

Since resident A has lived in her cottage the longest of those interviewed, she has made multiple modifications to adapt the cottage to meet her needs. In her bathroom, she changed every utility, “and it makes all the difference.” For example, she changed her bathtub to a walk-in shower allowing her to bathe more easily (Figure 3.1). She also has “lots of safety features in the shower so [she] won’t slip.” When she was in her wheelchair, she had plastic protectors installed at the base of the walls, especially in the hallway, because they got scuffed up as it was difficult for her to maneuver around the house (Figure 3.2). Additionally, because she likes the outdoors, her family added a large porch at her front door enabling her to sit outside and enjoy the nature; she is “awfully glad [she has] it” (Figure 3.3). She also has a bird feeder at her living room window so she can watch all different types of birds fly by. Most importantly, resident A’s aide assists her three hours a day, five days a week to help with any activities resident A cannot perform on her own. The aide buys resident A groceries, does the cleaning, and reaches items on the upper shelves that the resident cannot access on her own. As resident A said, “I wait for my aide; it just makes all the difference in the world.” She does not think she could live in the cottage without her assistance. Resident A’s son added that “A quality caretaker really makes a huge difference.” She also has her lunch delivered everyday through Foodnet; Foodnet

Meals on Wheels is a home delivery meal service for older adults in Tompkins County (Foodnet, 2010).



Figure 3.1. Resident A's walk-in shower.



Figure 3.2. Plastic protector at the bottom of resident A's doors.



Figure 3.3. Resident A's extended porch.

Resident B.

Resident B was 75 years old at the time of the interview, and had been living in the cottage for three years since his wife passed away. He was born and raised on a farm on the same road as his current location. Fifteen years prior to moving into the cottage, he and his wife moved from the family farm to another nearby location. Resident B enjoyed that new location, as it was closer to Cayuga Lake. Once his wife died, however, his sons thought he was spending too much money for rent at that location and suggested for him to move in with one of them. He therefore moved into an elder cottage on the property of one of his sons. He has four sons, all who live within a five mile radius of his current location. He sees his son who lives in the main

house every day; the son either comes to the cottage or resident B goes to the main house. His other sons visit him periodically. He also sees his daughter-in-law who lives on the property on a daily basis. One of his sons and daughter-in-law were interviewed. Although not the son who lives in the main house, the son interviewed takes care of his father's finances.

Resident B is very content with his cottage. Since he has only been living there for three years, he has yet to have time to make any large alterations. The cottage orientation on the site is incorrect as a result of poor communication, as it was supposed to be turned one hundred eighty degrees around the other way. The front of the cottage was supposed to be facing the street; instead, the back of the cottage is facing the street. In spite of this, he has adapted to the new placement. He would like to change the outside appearance of the cottage because he believes as though the materials used make it look cheap. Resident B did not decorate the inside of his cottage because this is not something he had done in the past. His daughter-in-law who lives in the main house did most of the decorating, although it is minimal. His main complaint about the cottage was that the flooring in the kitchen is white; he does not like white floors since he uses the kitchen door as his main entrance so the floor gets dirty very easily. He still uses the kitchen as he cooks fairly often. Additionally, one of his meals is delivered everyday by Foodnet. He also has a large dog which he cares for very well. Additionally, both resident B and his son noted that he has never slept in his bedroom; rather he falls asleep in his chair in the living room watching television every night. When asked to turn the television off for the interview, resident B stated that it was the first time he has turned the television off in three years.

Resident C.

At the time this research was conducted, resident C was 81 years old. Before moving into the cottage twelve years prior to the interview, she lived in Queens, New York for about 40 years. As she found herself lonely after her husband passed away, she moved to Tompkins County where her daughters live. She has two daughters and a grandson, all who live in the main house, and a son who lives in Missouri. Her two daughters living in the main house were interviewed. As resident C stated:

I see them [her daughters] every single day. I cook for them, right in my house. Everything is in my house. Even though it's only a few steps, I can't go up the staircase because my balance is not too good in the last couple of years. Yes, everyday they come over here, before they go to work, when they come out of work. It's convenient and it's nice.

Although her son lives far away and she does not see him often, he calls her every week.

When resident C first moved to the cottage, her daughter integrated her mother into the community. Her daughter had the decision to place the cottage either side by side to the main house or in the backyard; "To put her in the back I thought it would hide her because you want to make a person part of your extended family. I asked them to put it side by side so she could also see who would come in the driveway." Resident C's daughter also brought her mother to church events. Her daughter wanted to ensure that her mother would be part of the family rather than living by herself in the cottage. The daughter therefore did not have a television in the main house so her son would have to go over to his grandmother's cottage to watch television. This created intergenerational living where they all depended upon each other. Since the resident can still drive, she can go to the post office and food shopping on her own, allowing her to maintain her independence.

Resident C loves her cottage, as she always wanted a home of her own: “I always dreamed of having my own home and it wasn’t ever possible. So this was like a dream come true.” As a result of living in her cottage for nearly thirteen years, she has performed modifications to her home. She recently changed her bathtub to a walk-in shower. Although there is still an approximately 5 inch ledge she has to step over to get into the stall, she finds this easier for her than the original tub (Figure 3.4). Her daughters also painted her kitchen and living room walls as she likes “to change the color and the décor” (Figure 3.5). They painted the walls bright colors, similar to those she had in her apartment in Queens. Because of her short stature, she uses stools in the kitchen to reach items on the upper shelves. Knowing the danger their mother faces when reaching for cooking items, her daughters try to ask her what she is planning to cook the next day so they can take out everything for her beforehand.



Figure 3.4. Resident C’s new shower stall.



Figure 3.5. Resident C’s brightly painted living room.

Resident D.

Resident D moved into her cottage in September of 2009, about 10 months prior to the resident interview. Around that time, she celebrated her 75th birthday. Her cottage is located on the property of one of her daughters; her other two daughters live close by in Cayuga County. Before moving to the cottage, resident D lived in a senior housing development located about 20 minutes away from each of her daughters.

Although this development was relatively close to all three of her daughters, in case of an emergency, they wanted their mother to be closer to at least one of them. While there were other people in the development where she used to live, everyone kept to themselves; there was not a sense of community among the residents. Since resident D's daughters had heard about the elder cottage program, they thought they should put the cottage on the property of her only daughter who lives in Tompkins County; this was the daughter who was interviewed. As resident D stated, "my daughter comes over to make sure I'm up and all right in the morning, which was the whole purpose of me moving here."

Thus far, resident D enjoys her cottage. Since she still drives, she can go out on her own whenever she wants. She has yet to make any alterations to the cottage, although BHTC built her a new ramp because the original ones would not function properly on that particular site (Figure 3.6). While she enjoys this ramp, she thinks it could work better if a flight of steps were added at the back of the cottage. Her ramp goes across the front of the house and wraps around to access the kitchen entrance. In the middle of the ramp are three steps to get into the living room entrance. She would prefer if there were steps to get down from the ramp near the kitchen entrance so it is not necessary to traverse the entire length of the ramp to reach ground level.



Figure 3.6. Resident D's ramp as built by BHTC.

Main Issues

Interviews with the residents and their families reassured the researcher that the seven main issues determined through the literature review and preliminary research were still those to be addressed. These include: accessibility, ability to support social interaction/quality of life, ability to support ADLs and IADLs, sustainability, transportability/structural stability and zoning regulations. Each of these issues will be further discussed, noting their importance and what concerns these issues raise in relation to the design of the elder cottage.

Accessibility.

There are two entrances to the cottage, one accessible by a ramp and the other by three steps. As built, the ramp does not include adequate handrails to allow a wheelchair user, or someone with limited mobility, the ability to ascend the ramp. Because resident A was the only resident who was at one time in a wheelchair and finds it difficult to walk on her own, she had additional handrails installed on her ramp (Figure 3.7). Her son pointed out that “The code calls for a certain diameter handrail and none of them had that to begin with – it was a code violation.” Additionally, the ramp does not provide a smooth transition at the ground (Figure 3.8). Because of this, resident A had to install cement blocks at the base of her ramp to provide a smoother transition (Figure 3.9).



Figure 3.7. Additional handrails installed on Resident A's ramp.



Figure 3.8. Uneven transition on resident D's ramp.



Figure 3.9. Concrete blocks at the base of resident A's ramp.

BHTC ensures that the cottages have appropriate sized doors and clearances, allowing wheelchairs to access the entire cottage (BHTC, 2009c). While the doorways and hallway may be wide enough for a wheelchair to pass through, meeting ADA standards at 36" wide (Department of Justice, 1994), making this passage is not done with ease. As seen in the case of resident A, plastic kick guards were installed at the base of her walls when she used a wheelchair, demonstrating that the hallways may not be wide enough for easy wheelchair access throughout the cottage (Figure 3.2). The doors within the cottage are all equipped with lever door knobs. However the closet bifold doors have little round knobs (Figure 3.10). Additionally, the doors to the outside have round knobs (Figure 3.11); residents A and D have replaced their exterior door knobs to lever handles (Figure 3.12).



Figure 3.10. Small round knobs on closet doors.

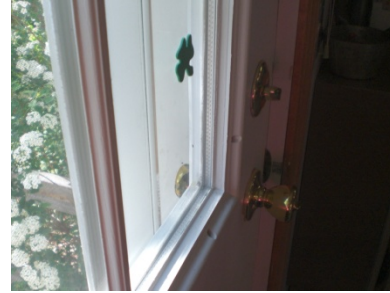


Figure 3.11. Original round knobs on exterior doors.



Figure 3.12. Modified lever door knobs on resident A's exterior doors.

The design of the bathroom is different than traditional ones because it is designed specifically for older users. The original bathroom was built with a tub with multiple grab bars, a shower seat, and a glide rail for the shower head (Figure 1.8). Additionally, adequate open floor space in the bathroom provides a five foot turning diameter, allowing a wheelchair user to easily maneuver (Figure 3.13). There is a grab bar located on one side of the toilet, and the sink has lever faucet controls and a mirror that tilts down from the wall. One complaint among the residents is that there was no medicine cabinet in the original design. Therefore, residents placed additional storage items in the bathroom, thereby taking away some of the clear floor space. Resident C's daughters pointed out that the toilet is smaller than a standard toilet; therefore they installed a raised toilet seat to make it more comfortable for their mother. They also added arms on either side of the toilet, allowing resident C to independently get on and off the toilet. Resident C's daughters complained about the temperature of the shower

water, stating that it only got lukewarm and that the pipes would often freeze. When they tried to fix that problem, the plumber stated that the cottage was equipped with the incorrect piping; the daughter stated that “they [BHTC] cut short on the plumbing in the way that was done.”



Figure 3.13. Open floor space in bathroom (Resident D’s daughter, personal communication).

The kitchen in the cottage is designed fairly similar to standard kitchens. One main difference is that there are no cabinets under the sink, allowing a wheelchair user to roll under the sink to easily access the faucet. However, as resident A’s son added, “I think if anything, the kitchen sink should be lower particularly for someone who was in a wheelchair. That would help a lot. Because you can’t really work at that sink in a wheelchair, it’s too high.” Each cottage has an electric stove; however, the design of each stove is different in each cottage. The stoves all have the controls in the front of the stove, except for resident D, which are located in the back causing her to reach over the burners to control the stove. While this does not currently affect the resident, this may cause a problem for her in the future if her mobility and strength becomes limited. Additionally, according to the residents, there is not enough counter space to prepare meals. While there is storage space in the upper and base cabinets, the cabinets are not all accessible because the shelves are either too high or too low. The

lower corner cabinet has a lazy Susan inside which all of the residents noted to be a big help (Figure 3.14).



Figure 3.14. Resident D's empty cottage kitchen (Resident D's daughter, personal communication).

Each resident uses the kitchen in varying amounts. Resident A does not cook; as she stated, "I don't cook...I used to love cooking but I couldn't stand up and that continues to be the problem." On the other hand, resident C uses her kitchen every day as she prepares meals for her daughters and grandson. Resident C's daughters pointed out that if their mother was in a wheelchair, they would have to move out the furniture in her kitchen. Since she uses the kitchen door as her main entrance, she would have to maneuver around her kitchen table to access the other areas of her cottage; therefore, they believe that the kitchen should have been given more square footage.

Residents use their bedroom varying amounts. For example, resident A spends the majority of time in her bedroom while resident B rarely goes into his. Within the bedroom is a closet behind bi-fold double doors located behind the door into the bedroom when it is opened. Resident A stated that she does not use this closet very often, "because it's behind the door and it's difficult" to access.

All of the residents, and most of their family members, would prefer the living room in the cottage to be larger. Resident C's daughter thinks that the living room

should be “a little bigger for company because she gets a lot of company and there just is not a lot of room.”

Within each cottage is a small storage closet. The water heater is located within the closet, and it also provides a fairly large amount of storage space. All of the residents use this closet for storage. However, as resident A stated, “If I had any complaints, it would be my lack of storage.”

Carpeted floors are found in the living room and bedroom, and vinyl flooring in the kitchen, hallway and bathroom. As seen with the residents who have been in the cottage the longest, residents A’s and C’s carpets needed to be restretched or replaced. Resident A restretched her carpet after being in a wheelchair as the carpet became wrinkled, which her son worried would pose a tripping hazard. Resident D’s carpet appears to be easier to walk on, as it has a tighter weave; however this may be due to the fact that her carpet is less than a year old. Additionally, while the vinyl flooring is easy to maintain, residents complained that it does not retain warmth in the bathroom, making their feet feel cold especially in the winter. For this reason, resident D placed a large rug in her bathroom. Also, when observing resident A walk on the vinyl flooring with her walker, the researcher noted that the walker did not glide as easily as it should on the flooring, possibly caused from poor maintenance of either the flooring or the wheels on her walker.

When requested by the resident, BHTC can make modifications to the cottages to increase its accessibility. As resident C’s daughter stated, “as she starts to deteriorate in abilities they [BHTC] come and make alterations on the cottage which is very nice.” Thus far, the residents have made modifications to the bathroom, door knobs, and the exterior ramp. These modifications were necessary due to changes in resident abilities throughout their residency in the cottage. In order to do so, the resident must fill out a reasonable accommodations/ modifications form in which they

specify the change they are requesting and explain why it is necessary (i.e. for accommodating a disability or medical condition).¹ Even though resident A has made the most modifications to her cottage, she says, “Well you can’t have everything . . . then what have you to look forward to?”

Ability to support social interaction/quality of life.

Residents who move into the cottages often have to leave their social networks behind and become reliant on their families for social support. Resident A and C both relocated to the cottages from outside Tompkins County: Troy, NY and Queens, NY respectively. In their previous locations, neither of these residents were close to family and they were both fairly isolated in their living arrangements. Therefore, while they moved to Tompkins County, they moved closer to family in turn strengthening their social network. Resident B and D both lived within Tompkins County before moving into their cottage; resident B lived in the same area his entire life, and resident D lived on the other side of Cayuga Lake. Therefore, their social networks remained fairly intact. As resident B’s daughter-in-law added “it [the elder cottage] allowed him to have the same quality of life.” Additionally, these two residents, as well as resident B, are still able to drive; therefore they can still easily get around on their own, maintaining their independence.

¹ “As per the Fair Housing Act, as amended and section 504 of the Rehabilitation Act of 1973, Reasonable Accommodations and Reasonable Modifications are permitted for individuals with disabilities in order to assure that such individuals have the full opportunity to enjoy and benefit from the housing program and/or facilities... This policy is put forward in compliance with the provisions of the Fair Housing laws and the New York State Division of Housing and Community Renewal (DHCR)” (BHTC, 2010).

When the family members were asked if they felt the cottage has enhanced their mother or father's quality of life, there were mixed reactions. While resident A's son is happy to have her close, he stated that

If she was in a nursing home, she would be more social... We have talked many times if she would be better off or any happier in a nursing home than she is here and in the end we always come back to no, she would rather be here. It is really her decision.

On the other hand, resident B's son stated that "the thing [the elder cottage] could be completely different and he would be happy here. I think it's his surrounding environment that makes him more happy."

The resident's level of social interaction varies from one resident to the next. Family members visit the cottage residents multiple times a day: resident B's family either comes to visit him or he walks to the main house whenever he likes. "You don't know when they are going to stop in, they just do... it don't bother me at all [*sic*]." Additionally, he knows all of the "old timers" from the area, which maintains a sense of continuity from before he moved into the cottage. His daughter-in-law added that his family "didn't really want him to be in a place where he wouldn't be able to be around family and friends." Resident C's family comes to her house multiple times a day since the resident cannot get into the main house. As resident C's daughter stated,

Since she was here, quality of life improved so much that she is still around. So I incorporated our habits so that she would be included in them. Therefore she would feel wanted, needed, have purpose. Because when a person doesn't have purpose, quality of life starts to dwindle.

On the other hand, Resident A no longer drives and has very limited mobility. Although she did drive when she originally moved to Tompkins County, her son talked her out of driving; he "think[s] it would be more difficult for her living where

she was and not driving than living here.” Her aide takes her to the doctor and goes grocery shopping for her; therefore this resident does not leave the house very often. Additionally, her family does not come to visit every day, making her feel deserted. Her son mentioned that he feels “there is a natural tendency for older people to feel neglected. I try to call when I’m gone.” However she does have her aide come in five days a week so she is not always alone. As resident A stated:

I don’t have the social support. And I don’t know whether I’m trying to make the whole situation feel better, but I really am a social person and if you aren’t around there, you have to get some stimulation from somewhere which is why I enjoy the computer.

Although all homes are different, familiar cues in the cottages provide the residents with a sense of home. Since the residents can bring the furniture from their previous home, it gives the cottage a familiar feel, bringing into their new home special items which remind them of their old home and of their past. This is true for residents A and D; they both brought furniture from their previous homes into the cottage. As resident A stated, “the furniture I have with me are my very favorite pieces of furniture because it all is full of memories – and that is what makes home a home for me.” Resident B’s family bought him new furniture when he moved into the cottage. Since he does not care much about the décor of the home, his furniture does not provide him the same emotional connection as it does with the other residents, as his daughter-in-law added, “he isn’t much for decorating... it’s just a house for him.” Resident C was unable to take her furniture as it was too old and fell apart in transit; however, the furniture she has in her cottage has been the same for the past thirteen years she has lived in the cottage. She did keep one piece of furniture from her old apartment – her rocking chair. This chair has special memories for her, as she stated, “I would never give it up. When anybody comes here they already know if they know

me, they know to sit anyplace else. The chairs or the sofa or whatever, but the rocking chair is my personal property.” Resident D’s daughter added that, “downsizing is a lot of times an issue because they’ve collected things over the years that mean a lot to them and they want to keep them.” While the residents enjoy their own furniture, many of the family members interviewed added that they wish their parents had less furniture. Resident A’s son stated that he wishes his mother “would have less stuff in there. A little less clutter ... I’ve taken a lot of stuff out of her house.”

Additionally, the residents can personalize the inside of the cottage since it is their home. For example, resident C painted her kitchen and living room walls bright colors; she plans on having her bedroom painted in the near future. Since she painted the walls similar colors to those she had in her previous Queens apartment, they provide her with reminders of the past.

Most of the residents found the lighting within the cottage to be inadequate, as most of them regularly use lamps. Resident A stated:

I like my own lamps, the warmth of the lamps, the feel of it. They [overhead lights] don’t provide enough light, and I don’t like the kind of light. I’m also developing a need for magnifying glasses, so this light here is perfect for me and I have my own magnifying glass.

Natural light comes through the windows in each room of the cottage. As resident A stated, “the house is bright...the living room faces south and also west, so I get good sun.” Resident D also stated that she uses the lamps in her living room and gets good amount of natural light as well. Since the cottages are equipped different light switches, it could not be determined by the researcher which type of switch was used in the original design of the cottage. Residents A and B have rocker switches (Figure 3.15) while residents C and D have toggle switches (Figure 3.16). All of the switches

have lights built into the switches, allowing the resident to find the light switches even in the dark.



Figure 3.15. Rocker light switches.



Figure 3.16. Toggle light switches.

Resident reaction to the temperature within the cottage varied; however, they all mentioned that their thermostats do not work properly. As resident A stated, “If I say 70 I can turn it up and it would just blow like crazy... That [thermostat in the bathroom] works a little differently than this one. It goes up and it just stays there, it doesn’t go any higher.” Resident B’s son also discussed how there were thermostat controls in each room:

Maybe that is ok, it might seem more efficient, but you got more things to break down, you have more things you have to go around and adjust. And for someone who is 75/76 years old who forgets a lot of stuff.

Resident C added:

Depending how I feel, sometimes it can be sunny outside and I’m cold cold, I don’t know why. I have electric and I put that on. The other one, the oil, I put it on only in the winter when it’s frigid.

Overall, the residents and their families are very satisfied with the cottages’ ability to maintain their quality of life. The temperature within the cottage and ability to easily have guests visit, were the main concerns among the residents.

Ability to support ADLs and IADLs.

As previously stated, based on the 2000 census, 7.8% of those 65 and older and living at home have ADL impairments, while 16.4% have IADL impairments (New York State Office for the Aging, 2009). Because of this, it is important for the design of the cottage to support the resident in performing ADLs and IADLs. The ability of the cottage to support ADLs and IADLs relies on the accessibility of the cottage. ADLs include: bathing, eating, getting in and out of bed, and toileting. IADLs include: keeping track of money, doing light housework, taking medications and running errands (Quadagno, 2008).

Some ECHO residents performed modifications to their cottages, as previously discussed. To better meet their personal hygiene needs, residents modified elements of the bathroom design. Resident A and C both replaced their bathtubs with a walk-in shower, allowing them independently access the shower. Residents do not have to rely on someone else to help them bathe with an accessible shower, providing them with greater independence. Thus far, residents B and D do not have difficulty in bathing. Resident A's son thinks that the cottage should have been built with "a shower instead of a bathtub."

Residents implemented other adaptations in their cottages to assist in transferring. For example, resident A sits in a recliner in her living room; someone constructed a wood base for this chair so that the seat would be higher up making it easier to get in and out of the chair (Figure 3.17). In her bathroom, as well as in resident C's bathroom, additional grab bars on both sides of the toilet make it easier for the residents to transfer to and from the toilet (Figure 3.18). Because of the small size of the cottage, the residents can easily get around. While most of the residents and their families would prefer the cottage to be larger, they like the small size and its ease of maintenance.

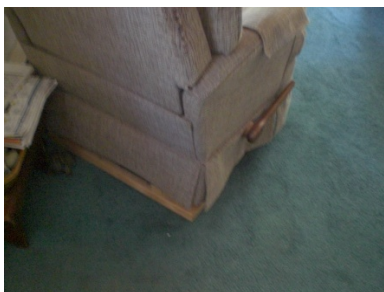


Figure 3.17. Modification made to resident A's recliner.

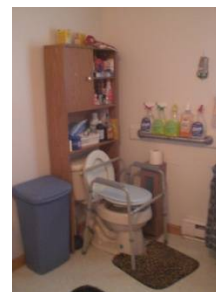
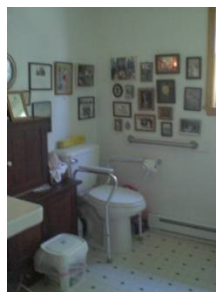


Figure 3.18. Resident A and C's modified toilets.

Each resident varies in their ability to perform IADLs. Again, because of the small size of the cottage, it is fairly easy to maintain as far as cleaning; however, some resident's abilities do not allow them to maintain the cottage themselves. Resident B may have the ability to do housework, however his daughter-in-law is usually the one who cleans. Resident B's son added: "That's another good thing about it, it's manageable. It would be more manageable if he didn't have the dog." Resident A's aid assists her in cleaning the house; resident A stated that "needing the help is inevitable."

The four residents vary in their ability to prepare meals on their own. While resident A stated that she stopped cooking because she could no longer stand, her son added that "She stopped cooking a long time ago. She was a good cook. I think she stopped cooking long before she was in a wheelchair. A lot of cooking is about sharing with other people." He also added that she has "an electric stove and she never cooked on an electric stove and I think that can be hard to get used to it. It might have been nice if you could get gas or electric." Additionally, resident A has assistance in preparing meals from her aid and from her Foodnet delivery every day. Resident B, C and D prepare their own meals. Resident C does the most cooking of all the residents as she cooks for her daughters almost every day; therefore her kitchen

easily becomes cluttered due to the lack of accessible counter space (Figure 3.19). She often has to use her kitchen table to store items while preparing meals. Despite these restrictions, she still enjoys cooking and stated that “I don’t like it when I’m not active. Because you feel useless.”



Figure 3.19. Resident C’s cluttered kitchen.

Resident A was the only resident who mentioned needing to take multiple medications a day. Since she has epilepsy, it is imperative for her to take her medications on time. She has a medication dispenser which alerts her to when she needs to take her medications at different times of the day. Resident A describes the dispenser:

It says what time and day it is and when the time is right all of a sudden this thing will start. I call it my witch, I can’t do without her, but at the same time I sure could like to for a while.

Only residents A and D have computers which they use frequently. Since it is difficult for resident A to leave her house, her computer provides her with some sort of social interaction. Resident B and C do not use the computer, nor do they want to learn.

Overall, the current cottage does an adequate job of supporting the ability for residents to perform ADLs and IADLs. However, the residents made some adaptations to assist them in performing these tasks. While these modifications help

the residents, they could be expensive to implement and therefore should be included in the original elder cottage design.

Affordability.

As a result of selling one's home and moving into an elder cottage, one has more disposable income due to the lower costs associated with living in the cottage. One only spends a fraction of their previous housing costs on the elder cottage (AARP, 1991). As previously stated, a requirement of living in an elder cottage is to have a Section 8 subsidy. Because of this, the monthly cost of the cottage for the residents is based on their income. Therefore, the residents can afford to live in the cottages. Cost was not the main issue for any of the residents when deciding to move into the cottage. Rather, residents chose to move to be closer to family and to receive care. Resident C stated that she could not longer affording living in Queens, so moving was necessary for her.

One problem the ECHO program faces is that Tompkins Community Action (TCA) may not renew the elder cottage programs' annual subsidy contract. As David Stoyell, Aging Services Specialist at Tompkins County Office for the Aging stated, cost "is the biggest and perhaps the only serious problem with the program," and that "the cost of moving these around is not sustainable for the long term" (personal communication, May 19, 2010). As previously stated, the relocation cost originally was thought to be \$10,000; instead it is \$35-40,000 (A. Piliero, personal communication, May 12, 2010).

The cost of actually building the cottages is another issue. By only purchasing and producing five cottages, the cost was higher than if more cottages were originally constructed; generally, buying a mass produced item is more cost efficient. Additionally, there are decreases in government funding for the program while the cost of building materials are increasing (BHTC, 2009c).

Sustainability.

The cottage is not designed using sustainable elements. Residents pointed out that it feels as though the cottage is not well insulated, especially in the winter, causing them to use more heat than necessarily needed.

Additionally, the life cycle of the cottage is unknown. Since the program may be ending soon due to insufficient funding, the question arises of what will happen to the cottages if the program ends.

Transportability/structural stability.

Existing modular homes are not built to move after the initial installation, yet the ECHO program requires that units be moveable. The cottages are intended to stay on someone's property until they are no longer needed at which point they will be relocated to the next place of need. The New York State's Division of Housing Community Renewal does not want the program to use standard trailers instead of the cottages, yet they have not discovered a better design that minimizes the cost associated with moving the cottages.

A large part of the expense of this program is the cost of moving the cottages from one site to another as this cost has escalated. Thus far, only three out of the five cottages have been moved.

Because the cottages need to be moved from site to site, the manufacturer of the cottages, MSI Plus, explained how the cottages are assembled differently from other modular homes which are permanent:

They [the cottages] are strapped down from the wall stud to the top plate to the floor joist with a 16" galvanized strap plus nailed down and then sheeted to tie the wall band and floor assembly together. The truss is nailed down thru the top plate with a 50D spike and then strapped as well, plus all the glue and screws we use to hold everything together. (B. Harvey, personal communication, June 28, 2010)

The two residents living in the cottage the longest, both around thirteen years, noticed that their cottages are not as stable as they once were. Resident A stated that “the house is not as tight as it was when [she] first came in.” Additionally, resident C pointed out the slanting of her kitchen floor, possibly due to the aging of the foundation, or to the high water table at this location. Residents B and D did not state that they have found any structural damage to the cottage from the move, as their cottages have already been moved from one site to another.

Zoning regulations.

Zoning regulations can create obstacles in placing the cottages on one’s property. For example, a local legislature may regulate and restrict the height, bulk, and location of buildings, the area of yards and open spaces, the density of population in certain areas, and the locations of buildings intended for particular uses. It is also necessary for the cottage to fit in with the character of the community, both in construction type and appearance.

In 1991, AARP published a document “Key Issues In Elder Cottage Housing Opportunity (ECHO): Restrictions on Manufactured Housing” which outlined some of the zoning issues ECHO units face. Local zoning ordinances were originally developed to safeguard property values; these have provided an obstacle when trying to place elder cottages (AARP, 1991). In the Report of the President’s Commission on Housing in 1982, the Council on Development Choices for the 80s determined that one way

to produce more affordable housing is to allow greater use of manufactured housing . . . Housing coming off assembly lines compare favorably in looks, livability and durability with conventional housing. When these units are sensitively sited and landscaped, little but price distinguishes them from other housing. Almost all local and state regulations, however, discriminate against

manufactured housing. These discriminatory policies cause communities to ignore and forgo a promising opportunity to narrow the gap between supply and demand for affordable housing. (AARP, 1991, p.3-4)

AARP found that implementing the following restrictions may alleviate restrictions on ECHO housing: the cottages should be movable; they should be specifically designed for older persons and persons with disabilities; they should be permitted only on a special or conditional use basis; and the primary homeowner should be required to post bond that the unit would be removed when the permitted special or conditional use terminated (AARP, 1991).

Since the cottages are owned by a third party, they ensure that the cottages will be promptly removed from the property. Therefore, the long-term community character will not change because they are temporary structures. The issue arises when residents are remaining in the cottages for longer than originally anticipated. While they are temporary structures, they have remained on the property for longer periods of time (P. Pollak, personal communication, June 27, 2010), as two of the original residents are still living in their cottages for the past 13 years. When BHTC's ECHO program first began, it was unknown how long the residents would remain in the cottages, as it was originally believed the turnover rate would be higher.

The issue of changing community character may not affect the elder cottages in Tompkins County because of the property on which they are placed. Three out of the four cottages included in this study cannot be seen from the main road or by the surrounding neighbors. Because of the land requirements for the cottages, they are placed on large properties. This raises the question that if the cottages cannot be seen by the street and by neighbors, is the issue of community character as important in these cases?

Each location has its own set of potential zoning issues to overcome. There are zoning requirements that change the way the cottage is designed and its location on the site. For example, the location of resident D's cottage was dictated by zoning regulations. Resident D's daughter explained the ramp: "Because it had to be so far away from the property line which meant the house had to be in a certain place and then in order to get the ramp to work, they put the posts in there."

Overall Reaction

All of those interviewed, residents and family members alike, viewed the elder cottage program as having a positive impact on their lives. As resident A stated:

I just believed in it, and I figured it would work one way or another, and thank heavens it has...I think it's a very good idea and I think certainly with what we hear in the future with healthcare, this is going to be very important.

Her son added "It's a good program. It's made a big difference for a number of different families around here."

Resident B's son stated,

It's a good concept, it basically puts you in the backyard of one of your kids, yet you don't have to live with them, and they don't have to live with you...I think they have done things as simply as they could.

Resident C enjoys having her own home, as she stated, "I don't think there could be anything better than having your own space and your independence."

Resident C's daughters think that the elder cottage is great because it keeps people out of nursing homes. As she described the cottage: "So you have a home, you are interacting, they are still living, they have purpose, they are wanted, they are loved, they are needed, there is normal drama." Resident C's other daughter stated that she does not "think that she would ever go back to the way she was because she always

dreamed of having her own home, and essentially it is her own home. She decorates it, she paints it the way she wants.”

Resident D stated that she is “real pleased with everything. It’s worked out well for me.” Her daughter added, “I think it’s a great program. It’s worked out really well for us. To have her there and keep track of things.”

Discussion

The interviews with the residents and their families revealed that the design of the existing cottage is suitable for its current residents. However, the cottage design can be improved to better support the evolving abilities of the aging population the cottage serves. This section will discuss the design of the current cottage, as well as aspects in which the design could be improved in future iterations. While focusing on the seven issues discussed in the results section, this section will set forth recommendations for a new design which will be accessible and affordable. Accessibility will be achieved by applying the principles of universal design to make the cottage supportive of the abilities of the aging population. Affordability can be achieved by developing an innovative way to construct and transport the cottages. Illustrations shown throughout this section provide examples of the solutions that should be incorporated into the new elder cottage design.

Guiding Principles

An elder cottage should allow its residents to live independently for as long as possible; for that reason, the overall design should support the residents' evolving abilities. The design should adapt to the residents' changing needs while still providing a safe and welcoming environment. Therefore, the principles of universal design should be incorporated in the new design for the elder cottages to accommodate varying needs of the individuals who are living in each cottage, but also the varying needs of their visitors. Because the cottage is intended to house multiple users, one after the other, incorporating universally designed elements into the new design will allow the cottage to adapt to different users' needs. Additionally, because universal design is beneficial for all users, regardless of their age or ability, the cottage does not necessarily have to be marketed as an elder cottage but rather as a modular home for anyone to purchase.

Jordan (2008, p. 11), interpreted the principles of universal design into a list of twenty universal design components which should be incorporated into home design to achieve accessibility. The list is as follows:

- At least one home entry that has no steps
- Flat or very low thresholds at doorways
- An open plan with wide doorways, halls, and passageways
- At least a 5-foot diameter clear turning space in rooms
- A plan that accommodates one-story living now, or can be adapted easily for this later
- If the house has more than one story, stairs that are low and deep, with handrails on both sides; if possible, include an elevator or space for one
- Light switches lower than standard and electrical outlets higher than standard, so they are easy for all to reach
- Easy-grip door, faucet, and drawer hardware, such as lever, C-shape, and D-shape handles
- Appliances designed and placed for convenient use from a standing or seated position
- Controls for appliances, heating, air-conditioning, and other equipment that are easy to reach, see, understand, and operate
- Plenty of lighting throughout the house, including natural light, ambient lighting, and task lighting
- Easy-to-operate windows, such as casements, awnings, and remote control units
- Generous counters in the kitchen, bathroom, and wherever a tabletop would be handy

- Work surfaces at various heights that are accessible for various users, standing or seated
- A roomy shower with a wide entry and an easy-to-negotiate threshold
- Chair-height toilets
- Grab bars or other handholds in the bathroom and elsewhere
- Reachable storage, including low cabinets, full-extension drawers, open shelves, and adjustable shelves and rods
- Smooth, firm, slip-resistant flooring
- Low-maintenance systems, materials and finishes

These components which have proven to be effective in accommodating a wide range of user abilities should be incorporated into the design of the new elder cottage. A new design that enables the cottage to adapt to the changing needs of the elderly will be beneficial to all who will occupy the cottage. A cottage design that supports the residents changing needs means that the residents do not have to adapt to their environment. This chapter details how the guiding principles of universal design, as elaborated upon in Jordan's list of universal design components, fit in with the seven key issues previously discussed.

Seven Key Issues

Accessibility.

It is imperative that every aspect of the elder cottage be designed to be accessible by all users. Through incorporating the principles of universal design into the new cottage, a greater amount of accessibility will be achieved. Since the current cottage does not incorporate all of these principles, in some cases, the residents had to adapt to their environments instead of the environment adapting to them.

The current design of BHTC's elder cottage was an adaptation of one of Ed Guion's elder cottages (B. Harvey, personal communication, July 20, 2010). As

observed from Ed Guion's (n.d.) website, the cottages are not designed with accessible features. For example, the kitchen (Figure 4.1) is built with standard height cabinetry. No alterations were made to accommodate various height users unless requested by the customer (B. Harvey, personal communication, July 20, 2010). The controls for the stove as seen in this image are located in the back, requiring the user to reach across burner flames to turn off the controls. Additionally, there is no space under the kitchen sink to allow for wheelchair access. Similarly, the image of the bathroom (Figure 4.2) shows that there is no wheelchair access to the sink. The sink faucet is not equipped with a lever handle, making it difficult for older adults to grasp and easily control. There is no floor space to the side of the toilet to facilitate transferring from a wheelchair. While the original Guion design may accommodate able-bodied users, it does not fully take into consideration the access needs of older adults.



Figure 4.1. Kitchen image from Ed Guion's website (Guion, n.d.).

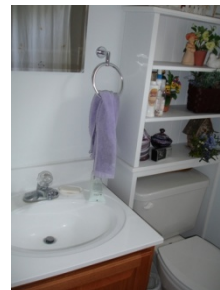


Figure 4.2. Bathroom image from Ed Guion's website (Guion, n.d.).

The New York State Division of Housing and Community Renewal, the New York State Housing Trust Fund Corporation and the Office of Community Development [OCD] dictated the standards to be incorporated into the BHTC cottage design which were not present in Mr. Guion's cottages. These standards published in the Design Handbook outline the guidelines which create "minimum housing standards for persons of low-income and to assist project sponsors and architects in

creating functional, safe, durable and cost-effective projects” (OCD, 2008, p. 1). The guidelines discuss dwelling unit space including kitchens, living room/dining room, bedrooms, bathrooms and storage. Guidelines also include provisions specific to the design of dwelling units for the elderly stating, for example, that a one-bedroom unit should be somewhere between 600 and 725 square feet. In the kitchen, 5 lineal feet of countertop should be provided as well as 30 lineal feet of shelving (Appendix I) (OCD, 2008). These represent minimum design standards which must be met in New York State for housing for older adults. While these are required, there are other design standards and guidelines which should be incorporated to enhance the accessibility of the elder cottages.

Exterior.

One example of guidelines which should be incorporated into the design involves the concept of visitability. Visitable homes ensure that any visitor who is using an assistive device, such as a wheelchair or crutches, can easily access the home. Specifically, Maisel, Smith, & Steinfeld (2008) define visitability:

Visitability is a movement that seeks to increase the supply of accessible housing through the inclusion of three basic structural features at the time of home construction: a zero-step entrance, wide doorways, and at least a half bath on the main floor of the home. (p. iv)

While visitability focuses on new home construction, older homes can be retrofitted to meet these three conditions (Maisel, et al., 2008). Although these elements are incorporated into the design of the current elder cottage, they could be better integrated into the design to further meet these criteria and improve access to the home.

One way in which the visitability could be improved is by altering the current ramp entrance to the cottages. At-grade entrances to homes in Tompkins County are

not appropriate due to local precipitation levels – it is possible that with an at-grade entrance water can get into the home without the proper treatments (M. Sickles, personal communication, April 29, 2010). The current cottage needs to be elevated a few feet off the ground to allow for electrical and plumbing lines, thereby prohibiting the ability for the cottage to have a true zero-step entry. The advantages of an at-grade entrance could be approximated with overhangs at each entrance to prohibit rain from getting into the house. Additionally, landscaping could be modified to allow for a gradual ramp to the front of the cottage (Figure 4.3). This could feasibly occur if the new cottage is built lower to the ground, decreasing the size of the crawl space underneath the house. A gradual path to the front door allows for a smooth transition along the entire entry to the cottage. To provide a gradual ramp, space around the cottage for landscaping is necessary. If, however, the cottage is located on a smaller piece of property, a gradual ramp may not be as easy to execute. While providing this ramp may require more initial site excavation, doing so might be cost effective because to date, the residents have remained in their cottages for over ten years.



Figure 4.3. Example of visitable home with a zero-step entry (IDeA, 2009, p.4).

However, if a ramp similar to the one currently used is still needed, and a gradually sloping path is not possible, there needs to be a smooth transition between

the ramp surface and the ground. As seen with the current cottages, the transition from the ramp to the ground is not smooth, as resident A had to install cement blocks to make her transition smoother. It has been found that an object 1.0 cm high creates a tripping hazard once every 2.1 strides; at 0.5 cm the probability is once every 95 strides. If there is a smooth transition, the probability of tripping is only once every 100 hours of walking or one trip every 266,305 strides (Feathers, 2009).

Overall, using a ramp and a set of stairs for the two entrances of the cottages is still a good option if the cottage needs to be built above the ground due to the local climate. However, alterations could be made to the stairs to improve their usability. The current set of stairs is built to standard dimensions: about a seven inch riser and an eleven inch tread. Unfortunately, these dimensions make it difficult for older users with mobility impairments to lift their legs high enough to make each step. Therefore, the stair riser dimension could be shortened and the tread dimension lengthened. A four inch riser and eighteen to thirty-four inch tread would be beneficial to older adults with reduced flexibility (Bakker, 1997); however, this staircase would occupy a larger amount of square footage than currently used. Even if the resident does not use these stairs every day, the presence of lower profile steps would be more negotiable than conventional steps in the event of an emergency.

Additionally, the ramp needs to be built in accordance with the Americans with Disabilities Act (ADA) Accessibility Guidelines (Department of Justice, 1994), which states that the ramp has continuous handrails on both sides extending 12 inches beyond the top and bottom of the ramp (Figure 4.4). The ADA also stipulates that there should be 1-1/2" between the wall and the handrail, and the handrail should be between 34 and 38 inches above the ground, and that the handrail itself should be 1-1/4" to 1-1/2" wide (Figure 4.5). Although these are standards for public accommodations and commercial facilities, they are standards to follow when

designing a ramp for the cottage. The ramps on the current cottages were not initially equipped with handrails; for example, resident A needed to have handrails added after the installation of her ramp. Handrails should be included in the original design so they will be readily available when needed by the resident.

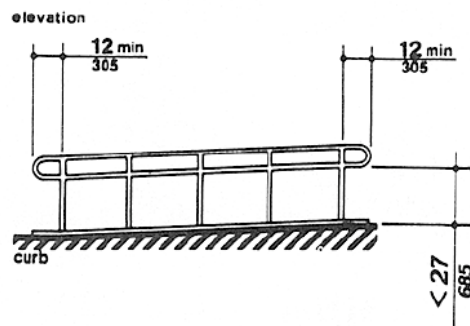


Figure 4.4. ADA ramp standards for handrail extensions (Department of Justice, 1994, p. 31).

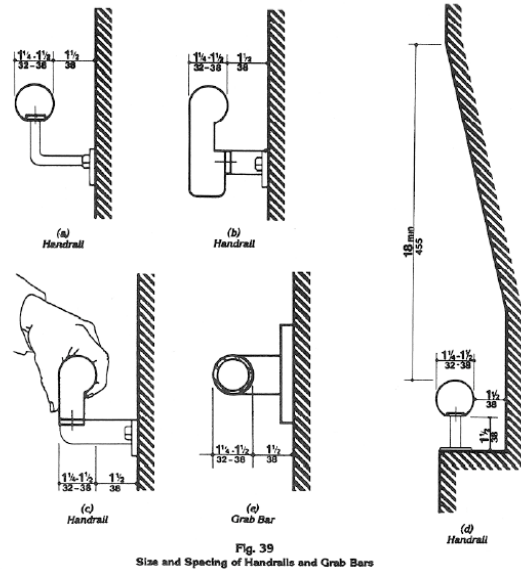


Figure 4.5. ADA standards for size and spacing of handrails and grab bars (Department of Justice, 1994, p. 51).

Additionally, the exterior of the home should have multiple light fixtures. They should be located near the main doorway, as well as on the sides of the home especially if the ramp wraps around the side of the cottage. This additional safety feature would be helpful for the residents and visitors when entering or exiting the cottage at night, thus increasing visibility of the ramp and stairs and decreasing the chance of tripping.

Overall floor plan.

Once the resident is safely inside of the home, it is important that the same safety features incorporated on the exterior be carried out in the interior of the cottage.

The concept of visitability should be incorporated inside of the home as well, specifically by providing wide doorways and an accessible bathroom. Additionally, the interior of the cottage should have open living spaces to accommodate wheelchair users.

Existing design.

The floor plan of the current cottage is fairly simple. As previously shown, the floor plan of the existing cottage is comprised of four rooms connected by a hallway. While the current cottage provides adequate space, the square footage of each individual room is relatively small. Additionally, there is little room for easy mobility, especially if the resident is in a wheelchair. As resident C's daughters noted, if their mother was to be in a wheelchair, they would have to remove all of the furniture in the kitchen to allow her to maneuver into and around this space. Also, when resident A was in a wheelchair, it was difficult for her to maneuver in the hallways as evident in the scuff marks on the walls.

Design suggestions.

Incorporating visitability features into the interior of the home would include more generous hallway and doorway widths. Making these spaces wider would allow users to more comfortably navigate the space and access all areas of the home without the need to make sharp turns.

According to the First quarter 2010 Home Design Trends Survey by the American Institute of Architects, houses in the United States are getting smaller in size, with an increase in the desire for greater accessibility in the home. Therefore "open floor plans and layouts that allow flexibility to accommodate Americans' evolving lifestyles" are becoming more popular (Miller, 2010, para. 1). People enjoy smaller homes because of rising energy costs as well as lower property maintenance. This survey found that there is an increased interest in open floor plans (56%) as well

as desire for accessibility (60%). Therefore, even though the cottages are small, an open floor plan can increase the usability of space (Figure 4.6).



Figure 4.6. Example of open floor plan (FabCab, 2010).

Miller (2010, para. 4) notes that, “The aging population and growth of multigenerational households both are driving the need for open layouts and accessibility.” An open floor plan would be beneficial for the new design of the elder cottage. If the living room, dining room and kitchen were one open space, there would be more flexibility as it would be easier to change the furniture layout to allow for a wheelchair user to easily navigate the space. Additionally, emphasis should be placed on the design of the kitchen, as “the kitchen is *the* [emphasis included in original text] gathering place in every home. It's the center of activity and a genuinely friendly room” (NAHB, 2007a, p. 5-27). Therefore, the kitchen would be a place to prepare food as well as a place for socializing. This would be especially beneficial to those like resident C as her daughters eat dinner in the cottage most nights. An open floor plan allows for additional room to socialize, and it may also provide the user with additional counter and storage space, which was a main complaint among the residents.

Overall, the floor plan should take into consideration the needs of older adults. An open floor plan allows for flexible furniture arrangements and wheelchair users to easily maneuver around the house.

Bathroom fixtures.

Similarly, a properly designed bathroom can allow residents to easily maneuver around the space and independently perform activities of daily living in the bathroom.

Existing design.

Currently, the bathroom has sufficient floor space for a five-foot wheelchair turning diameter, and provides enough room for a person to transfer to the toilet and into the shower. The original cottage was equipped with a tub. However, the tub provided is not deep enough for someone to take a bath. Additionally, two out of the four residents have converted their tubs into showers. Therefore, having a tub in the elder cottage may not be practical. There are grab bars around the exterior of the tub with a fold-down shower seat. No shower curtain was provided; therefore the residents were required to install their own. Two of the residents use a tension rod for their shower curtain. Resident A stated that once her towel rod fell because the rod could not hold the weight of the wet towels when they were placed over the rod to dry. The current toilet is lower than standard, making it difficult for older adults to use, especially those who cannot stand up from and sit down on a seat so low. The original sink does provide wheelchair access as well as lever faucets. There are also towel racks around the sink (Figure 4.7).



Figure 4.7. Existing bathroom in the elder cottage (Resident D’s daughter, personal communication). (note: hutch over the toilet was installed only in this cottage)

Design suggestions.

Often bathrooms can pose unwanted hazards to users. The National Safety Council found that over 200,000 U.S. citizens are injured in their baths every year (NAHB, 2007a). Therefore the design of the new bathroom should provide a safe and functional space, suitable for all users. “Good design will not only support independence, but it will also accommodate increased need and assistance when necessary” (Brawley, 2006, p. 186).

Similar to the current design, and following the principle of universal design specifically providing adequate size and space for approach and use, there should be a five foot turning diameter to accommodate a wheelchair user. Instead of a tub, a shower should be incorporated into the new design. While some may enjoy taking baths, installing a shower unit rather than a tub is the appropriate accommodation in housing for older adults with declining mobility. A roll-in, or no-curb shower, provides a smooth transition from the bathroom into the shower stall without posing a tripping hazard for both standing and seated users. The floors should be sloped slightly to drain so that the water from the shower does not flood the rest of the room. Additionally, “a built-in bench or folding seat, a handheld shower spray on a vertical slide bar, integrated soap compartments, and strategically placed grab bars” (Jordan, 2008, p. 76) make the shower easier to use for all users. The new design should

seamlessly incorporate the shower seat to assist in transferring and to provide a surface upon which to place shampoo and other shower items. Additionally, a handheld shower spray is easier to use by a seated bather (Figure 4.8). The shower should be equipped with an anti-scald valve which ensures that the user does not get burned.



Figure 4.8. Example of walk-in shower with integrated shower seat (Jordan, 2008, p. 92).

The toilet should be chair height between 16” and 19” above the floor instead of a standard toilet. A toilet installed at this height, called “comfort height,” puts less strain on the users’ back, legs and knees (Lawlor & Thomas, 2008) (Figure 4.9). This height may not be comfortable for shorter users; therefore a standard height toilet could be utilized, and if needed, a riser could be added (Brawley, 2006). Additionally, there should be grab bars located to the back and side of the toilet, as specified by the ADA guidelines to assist in transferring.



Figure 4.9. Comfort height toilet (Jordan, 2008, p. 79).

The sink should accommodate both seated and standing users. A lower sink may be good for a wheelchair user, but may cause back problems for a taller person. Therefore a height adjustable sink would be beneficial for all users because it can adapt to the needs of that particular user. The sink basin should be located close to the edge of the counter to minimize the reach necessary to access the faucet, which should have lever controls. A single-lever faucet allows both right and left handed users to adjust the water temperature. It is important that the lever is easy to push in both the on and off directions. If the water pipes are exposed, they should be covered to prevent scalding (Figure 4.10). Storage space should be provided near the sink with a counter and a medicine cabinet. The cabinet should be located in a position which is easy to open, such as next to the sink on the side wall instead of above and behind the sink. Bathroom cabinets should be easy to open with either U-shaped cabinet handle, a magnetic spring latch or surrounding lip which should be large enough to grip and pull (Krueger & Stewart, 2010).



Figure 4.10. Adjustable height sink (Jordan, 2008, p. 85).

Residents complained about the temperature of the flooring in the bathroom, especially in the winter. It is important to utilize the proper flooring material to ensure resident safety in the bathroom. Flooring should have a matte finish which does not become slippery when wet and does not produce glare (Lawlor & Thomas, 2008).

All grab bars, towel rods and shower curtains must be installed into wall studs or with heavy-duty anchors. This is because users grab anything within reach if they are falling. Therefore anything which can be grabbed for this purpose needs to provide support for the users. Grab bars can be seamlessly integrated into the bathroom design with different colors and textures. There should be color contrast between the grab bars and the wall so that they are easy to see, especially for older adults who may have vision related changes that occur with age.

Appropriate lighting within the bathroom can make it a safer space for the user. Illuminated rocker light switches should be used, as currently found in resident A's cottage. Lighting should provide general illumination as well as task lighting near the sink area. An important vision-related consideration when selecting materials is to provide for high color contrast, especially between the counters and flooring. Also, materials should be glare-free recognizing that older eyes are more sensitive to glare and vulnerable to glare induced injury (Krueger & Stewart, 2010).

Overall, the new bathroom design should seamlessly incorporate accessibility and safety features. Specifically, the roll-in shower with shower seat, comfort height toilet and additional grab bars would allow the residents to bathe independently and safely.

Kitchen.

Similar to the design of the bathroom, the kitchen should allow room for maneuvering and easy access to all fixtures and appliances.

Existing design.

The current kitchen is designed similar to other residential kitchen with industry standard height upper and base cabinets. With a lazy Susan in the corner cabinet, the residents can utilize the corner space. There are standard appliances, including a refrigerator, freezer and a stove. The residents complained about their lack of counter space and accessible cabinet space; this needs to be addressed for quality of life purposes.

The empty space below the sink is one non-standard element of the kitchen. This space allows a wheelchair user access to the sink. The counter is a few inches lower than standard, but, as resident A's son pointed out, the sink is still too high for a wheelchair user to easily manipulate.

Design suggestions.

While a well-designed kitchen is important for quality of living, “when one begins to have difficulty with strength, balance, sight, hearing, and generally getting around, the kitchen can become a challenging place. Add a wheelchair and the friendly kitchen becomes fraught with danger as well” (NAHB, 2007a, p. 5-27). “A kitchen designed for smart aging will do much more than make food preparation pleasant. It will enhance the quality of your life, however long and productive it may be” (Bakker, 1996, p. 78). Generally, certain design features are beginning to be

incorporated into kitchen design to make them easier to use by all individuals and in particular older adults who may have limited mobility.

The kitchen should incorporate varied height counter tops: “thirty- to 34-inch-high counters are more comfortable for those who are preparing meals while standing or seated, while 27-inch-high counters are more comfortable for someone to be seated in order to actively prep food” (Lawlor & Thomas, 2008, p. 114). Resident A stated that she no longer cooks because she could not stand up long enough to prepare a meal; if the counter were accessible from a seated position, she may be more likely to continue cooking. A larger toe kick could be incorporated into the kitchen design to make the lower cabinets easier to access and to accommodate wheelchair footrests. However, this would take away valuable storage space if the counters are kept at the same height. Upper cabinets should be placed 15” above the countertop for easier access, in contrast to the typical 18”. Similar to the idea of a lazy Susan, full extension drawers and pull out shelving would make it easier to get to items in the back of the cabinet. Additional storage space should be incorporated into the design of the kitchen, such as pull out pantries and cutting boards (Figure 4.11). Pull-out work surfaces would be helpful if located at counter height level to provide for more counter space when preparing meals (Figure 4.12). All cabinets and drawers should be equipped with easy to grasp handles, such as U-shaped pulls (Krueger & Stewart, 2010). Because the kitchen in the cottage is fairly small, it is important that residents have adequate storage and counter space.



Figure 4.11. Shelves and pull-out storage provide easier access (Jordan, 2008, p. 64).



Figure 4.12. Counters at different heights and pullout cutting board (Jordan, 2008, p. 55).

It is vital to choose the appropriate appliances for the kitchen for safety and utility reasons. Stoves should have intuitive, easy to understand controls at the front of the stovetop rather than in the back (Figure 4.13). Not having to reach over the burners to adjust the temperature decreases the risk of burns. Additionally, there should be clear counter space next to the stove to place items while cooking. Drawer style appliances which reduce the need to bend down as much as with other types of appliances have been shown to assist older adults. For this reason, drawer style dishwashers and refrigerators are recommended for the new designs. With age, there is a gradual loss of muscle strength and aerobic capacity making daily activities more difficult to perform. Additionally, 10 million Americans are affected by osteoporosis and 34 million have low bone mass; therefore, these people experience back pain which results in their inability to lift, carry or bend (Quadagno, 2008). While drawer-style appliances may be beneficial to users as far as accessibility, they may be too expensive to install in this type of setting. The current cottage does not come with a dishwasher, and the residents never mentioned that this was something they wish to have; however, a small drawer-style dishwasher suitable for one person could be installed; however, this would take away from storage space.



Figure 4.13. Easy to read and reach oven controls
(Krueger & Stewart, 2010, p. 60).

As seen in the current cottage, providing empty space underneath the sink allows a wheelchair user to access the sink. This concept should be incorporated into the new cottage design. However, additional enhancements can make sinks even more adaptable to different user's needs. Similar to the bathroom, the kitchen sink should have appropriate faucets, ideally a single-lever faucet as it can be used by a right or left handed user. The sink could have a pull-out spray attachment so it is easier to fill up pots and clean the sink (Krueger & Stewart, 2010).

The space under the counter is currently used by all of the residents as a place to store garbage and recycling containers. The current design does not provide an alternate spot for these items if the user is in a wheelchair. The new design should therefore provide space for garbage and recycling close to the sink.

The kitchen should also provide adequate amount of lighting, both general illumination as well as task lighting located under the counter.

Because the kitchen can serve as the hub of one's house, it is important that the new design for the elder cottage kitchen be designed for optimal use. While some of the current residents cook more than others, if the kitchen were designed to be more user friendly, all residents may be more likely to continue cooking.

Flooring.

It is important that the flooring is safe for the residents in all areas of the home, especially the bathroom and kitchen.

Existing design.

The current cottage flooring allows for easy maintenance. The vinyl flooring in the bathroom and kitchen is a good choice because it is easy to clean; although as resident B pointed out, his white floors show dirt very easily therefore appearing unclean. The carpeting in the living room and bedroom provides a soft surface on which to walk. However, as seen with resident A, when using a wheelchair on the carpet, the wheels caused the carpet to wrinkle resulting in a tripping hazard. Additionally, the transition from the vinyl in the kitchen to the carpeting in the living room is not a smooth and level one, possibly due to the foundation and the way the two modular halves of the house structure fit together.

Design suggestions.

Flooring should be “slip-resistant, nonglare, durable, [and] easy to maintain” (Jordan, 2008, p. 62). Similar to the flooring used in the current cottage, a hard surface flooring material should be used in the bathroom and kitchen. The flooring material should be slip-resistant to ensure that the users will not slip if the flooring is wet, and should be easy to maintain. Vinyl, rubber or cork floors are good options for these spaces. Carpeting should be used in the living room and bedroom as in the current cottage to give these areas a homey and cozy feel. The carpeting should be low pile, with tightly woven fibers. This would provide a soft walking surface while still allowing a wheelchair to easily move across the carpet. There should be a smooth transition from the carpeting to the hard surface, similar to the ramp transition, to avoid a tripping hazard (Jordan, 2008). Therefore, selecting the proper flooring helps maintain safety for the cottage residents.

Miscellaneous.

Other elements of the cottage are also important to consider when evaluating the accessibility of the cottage within the universal design framework. For example, the rocker light switches found in resident A's current cottage are ideal. These switches are easiest for older adults to use because of the various ways rocker switches can be turned on and off (either with one's finger, elbow, fist, etc.). Additionally, the lights located in each switch enable the residents to locate the switches in the dark. The switches should be located lower than normally placed, between 42" and 48" above the finished floor, for easier access (Lawlor & Thomas, 2008). Using the same principle, the electrical outlets should be located higher on walls at 22" so that they are easier to reach by the resident without having to bend over (Lawlor & Thomas, 2008). Lastly, since the bedroom and living room do not come with any built in features, these rooms should be large enough to accommodate the resident's furniture and a variety of furniture layouts.

Cost of adding accessibility features.

The alterations discussed in this section allow the new cottage to be built with elements of universal design. If the decisions are made to include these features early on in the design process, additional work or cost for making adaptations will be minimized. Some nontraditional elements, such as various counter heights and locating electrical outlets higher on walls, may go against traditional installation methods; however, these features are important to better accommodate the end user – older adults. While these cottages would be designed for use as elder cottages, if they are mass produced, they can also be used for others who are interested in purchasing a small modular home. Universal design ensures that the designs are not institutional in appearance, yet that seamlessly ensure accessibility. Specifically, *The Accessible Home* written by Lasoff and Lorentzen (2003) provides a fairly comprehensive

checklist of all of the elements which should be included in a home intended to be lived in by older adults.

Example: FabCab.

FabCab, or fabulous cabins, are healthy, sustainable homes designed for all ages. Similar to the prior discussion, the designers “weave Universal Design principles into everything [they] do and [they] are dedicated to designing friendly, inspiring spaces for people to live their active lifestyles in” (FabCab, 2010, para. 1) (Figure 4.14). Their cabins “enable people to thrive regardless of their age or ability” (FabCab, 2010, para. 1).

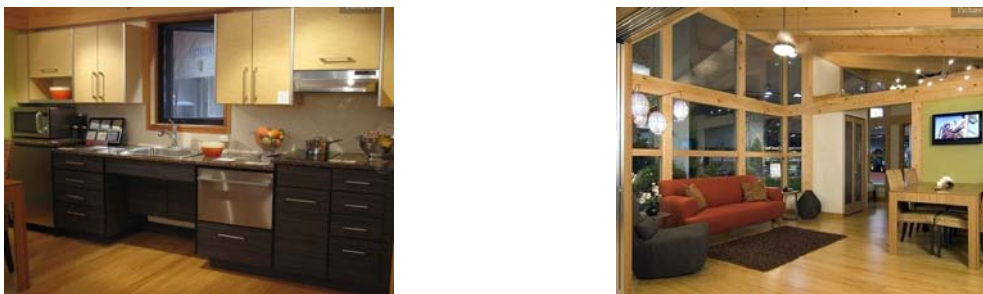


Figure 4.14. FabCab kitchen and open living area (FabCab, 2010).

This same concept should be integrated into the new elder cottage design. As previously stated, incorporating universal design principles into the new design will allow residents of all ages and abilities the opportunity to comfortably live in the cottage. Overall, an accessible and visitable home can create a living environment in which the cottage residents can safely age in place and enjoy their lives with the company of others.

Ability to support social interaction/quality of life.

When an older adult moves from one location to another, often their quality of life decreases due to the nature of the transfer and the environment itself (Oswald & Wahl, 2004). While this may be true for residents moving into institutional settings,

the elder cottage allows for an easier transfer from one location to another as the residents maintain their independence and social connections, especially to their family. “Research shows that independent living promotes life satisfaction, health, and self-esteem, three keys to successful aging” (Maisel et al., 2008, p. 4). Therefore, if the cottage is built to be accessible based on the principles of universal design, the residents can live independently without having to rely on others for help.

For the cottage to support social interaction, it is important for it to be large enough to accommodate visitors. Inadequate space for accommodating visitors was a problem especially for resident C as her daughters ate dinner in her cottage most nights. Given that the kitchen table is the only surface large enough for any social activity, such as eating together or playing board games, both resident C and her daughters had to constantly rearrange the items in the kitchen. More flexibility in how the furniture can be arranged would be provided with an open floor plan, incorporating the kitchen, dining room and living room into one large open space, in turn allowing for more social interaction.

Additionally, being physically comfortable in the cottage, and having the ability to control the environment, helps the residents maintain their independence thereby enhancing their quality of life. For example, the temperature in the cottage was an area of concern for the residents, and accurately controlling the temperature in each room was difficult. With the “loss of the layer of fatty tissue beneath the skin that helps insulate the body”(Quadagno, 2008, p. 136) older adults find it harder to adjust their body temperature to changes in temperature. Therefore, it is important that the residents can adjust the temperature within the cottage to that which is comfortable for them. This is especially important in Tompkins County where the temperature can get very cold in the winter and very hot in the summer. Additionally, since there are thermostats in each room of the cottage, the residents have to remember

to adjust each one individually. Because of the electric heating system, it is difficult to adjust the temperature to that which they desire. The residents pointed out that it would take a while for the temperature to change, and it did not respond accurately to the input, causing frustration among the residents. In the new cottage design, the thermostats should have perceptible information, be easy to read and easy to use, to allow all users the ability to properly control the temperature. Another issue was the water temperature in the shower. Resident C's daughters noted that the water temperature in their mothers' shower was not set to go high enough. The new design should incorporate an anti-scald valve which ensures a safe water temperature range. It is important that the residents can take a shower at a temperature which is comfortable to them without being too hot or too cold.

Another issue in the bathroom which affects the residents' quality of life is the number of light switches found in this room, each of which controls a different light or fan. While it is beneficial to provide the residents with control options, determining which switch would perform the action they desired was challenging. Residents were observed to flip through each switch until they found the one they were looking for. The recommendation for the new design is that light switches be organized in a more intuitive manner, making it easier for residents to know which switch belongs to which light fixture.

Overall, the amount of lighting solutions provided in the cottage was not adequate for many of the residents, making them use multiple lamps in many of the rooms. Therefore, more lighting options should be integrated into the original cottage design. Additionally, more natural lighting should be incorporated by providing larger windows, and possibly providing various types of windows, such as clerestories.

While the interior elements of the home can help maintain a high quality of life and social interaction, the family living in the main house affects this as well.

Resident A has made adaptations to her cottage to enable her to live there for as long as possible; however, she still feels neglected and as though she does not have the social support she needs. On the other hand, resident C is very integrated with her family living in the main house and integrated into the community; because she still drives, her independence is maintained and she has the ability to get around on her own. The ability to drive has been shown to make a big difference in ones measure of their quality of life and social interaction.

Overall, an accessible cottage would greatly enhance the residents' quality of life because they could live independently. For resident C who never had her own house, she now lives independently in a home she can call her own. The ability for residents to live close to their family members enables them to maintain a high quality of life and enhance their social interaction.

Ability to perform ADLs and IADLs.

As an accessible home can help maintain the residents' quality of life and social interaction, the same can be said for the residents' abilities to perform ADLs and IADLs. Additionally, the ability to support and promote high quality of life lies in the ability of the residents to independently perform ADLs and IADLs. Most importantly, the design of the bathroom and kitchen should allow each resident to independently perform their daily activities, including bathing and preparing meals. Moreover, the design of these spaces should be flexible and adaptable to the residents' changing needs as well as the needs of the different residents who may live in the same cottage in the future.

As previously stated, if the design of the bathroom is more accessible, it will be easier for residents to independently perform their daily activities. Incorporating the principles of universal design into the design of the bathroom, specifically the toilet, sink and shower, would help support the residents' abilities to perform daily

tasks. The shower should have a hand-held shower head, making it easier for a seated user to bathe independently. Additionally, because the original design did not incorporate a medicine cabinet, residents brought additional pieces of furniture into the bathroom in which to store their belongings, taking away from the bathroom's open floor space. Therefore, a medicine cabinet which is easy to reach and open should be incorporated into the new design of the bathroom. A medicine cabinet would allow residents to keep their medications and other items within easy reach of where they are going to need to use them.

Similarly, if the kitchen is designed to be accessible, the residents would have the ability to prepare meals independently. Choosing the proper appliances is important when designing spaces for older adults as it becomes increasingly difficult to bend over with age. Therefore, all appliances and storage areas should be easily accessible. Utilizing special hardware allows for shelving units to lift up from base cabinets or lower down from the upper cabinets (Figure 4.15). Drawer style appliances, such as freezers and dish washers, would be beneficial because they are easier to access; however, they take away from storage space and they are more expensive than traditional appliances.



Figure 4.15. Special hardware allows upper shelving to be lowered (Jordan, 2008, p. 69).

Because the current bedroom closet is located behind the door into the bedroom, it is difficult for residents to independently access their clothing. Some residents only use the closet for items which they do not need every day, such as storage for sheets; others use it every day. When the researcher asked to look in the closet, the door into the bedroom had to be closed and items in front of the closet doors had to be moved away. Therefore, in the new design, the closet should be relocated to an area of the room which is easier to access, allowing residents to easily access the closet and its contents. Additionally, within the closet, the height of the shelving should be adjustable so that the residents can access both the items which are hanging up as well as the items on the shelf above. Some of the residents made this change independently; however, it would be beneficial if this was incorporated into the original design. In addition, the existing handles on the bi-fold closet doors are small round knobs; this type of knob has been found to be difficult for older adults to easily grasp. Therefore, an alternative knob should be used on the closet such as a lever handle. As resident A pointed out, “My back door and my front door have the kind of handles that an older person should have and you just push down on it, or use your elbow.” Using lever knobs on all doors allow for easier use for older adults.

Example: MEDCottage.

As previously discussed, the MEDCottage is a small cottage which incorporates technology to assist with care-giving (N2Care, 2010b). The new design of the elder cottage would benefit from including similar features as the MEDCottage. While this may increase construction costs, inclusion of MEDCottage-type features would allow the residents to remain in the cottages longer and relieve some of the burden of caregiving tasks on the family. One important feature to be included is a monitoring system which indicates the movements of the resident and can detect if the resident falls. Other important features of the MEDCottage include temperature

control, web cam and voice communication, vitals monitoring, and air filtration. Again, these features would allow the residents to feel safer living in their cottages in the event of an emergency, such as a fall; however, the cost of implementation may be too high for this type of elder cottage program which is meant to serve people with low income. BHTC would need to determine if these additional safety features would be necessary. Discussing these features with current and potential residents and families may allow BHTC to see if the residents would value having these features incorporated into the new cottage design.

Overall, a properly designed cottage will support the resident's abilities to perform ADLs and IADLs. As previously stated, when a person can independently perform these activities, their quality of life increases. Therefore, building an accessible cottage, utilizing the principles of universal design, not only makes the residents safer, it also increases their social interaction, quality of life, and independence in performing daily activities.

Affordability.

The cottage needs to be affordable both for the residents as well as the cost to build and relocate each structure. Research has shown that among persons age 50 and older, cost is the main issue for opting out of making home improvements that would assist them to age in place (Maisel et al., 2008). Therefore, these enhancements should be incorporated in the original design so alterations do not need to be made once the cottages are in use. Because the cottage is connected to the electric, water and sewage lines from the main house on the property, additional costs are not incurred for those services. As the rent for the cottage is subsidized through the HUD section 8 rental assistance program, rent is very reasonable for all of the residents. Additionally, the nature in which the current elder cottage is constructed is more cost

effective than site-built homes as modular construction can save 10-20% of the cost of a stick-built home constructed on the site (Maynard, 2008).

Additionally, some appliances and hardware may be too expensive to be incorporated into the cottage when making home modifications. However, if these items are initially utilized in the original, mass produced cottage design, the cost may decrease. Putting more money into the construction of the elder cottages may allow the cottages to have a longer life span, ensuring they would be useable for a longer period of time.

Advocates counter that the basic features of visitability are an inexpensive part of housing design when incorporated at the early stage, that builders have developed innovative design practices for difficult sites, and that many communities with home access requirements have been flexible in enforcing visitability ordinances to accommodate site or other problems. (Maisel et al., 2008, p. vii-viii)

The same can be said for universal design; if incorporated in the beginning of the design process, these expenses are not going to be as much compared to the cost if they are changed later on by the residents.

Clearly, construction costs for building new cottages according to the principles of universal design will have an impact on affordability. An equally important cost issue that affects the ongoing affordability of BHTC's elder cottage program is the expense of relocating each cottage from one user site to another. As stated in the BHTC Strategic Plan (2009a), threats to the ECHO program are the costs of building materials as well as the cost of moving the cottages from site to site. Because the cost of moving the cottages was more than originally anticipated, the money BHTC has to relocate the structures is depleting and they may not have the funds to move the existing cottages once they are no longer needed (A. Piliero, personal communication, May 12, 2010). The main relocation expense comes from

the cost of the crane which places the cottage on the site. Therefore, a new way of building and transporting these cottages needs to be developed without the need for a crane.

If the cottage is designed using the principles of universal design, it can be used by all user groups. Therefore, the cottage does not need to be marketed only as a senior-friendly cottage, but rather as a home anyone can purchase, regardless of their age or abilities. If the cottage were produced and sold to a larger market, the cost per unit could be reduced through amortization of manufacturing costs over a larger number of housing units. If this cost reduction were passed on to the purchasers of the cottages, operation of the elder cottage program by BHTC would be more affordable.

Similar to the current cottage, the new cottage should be factory built as a modular home because of the cost benefits. Incorporating universal design and visitability principles into the original design will decrease the expense needed for modifications later on in the life cycle of the cottage. Most importantly, ensuring that the cost for relocating the cottages is as low as possible, the program can better afford this expense, and ensure the continuation of the program.

Sustainability.

To cut down on the cost of constructing the cottages and the program itself, it is important for the new cottage to be designed through a sustainable lens, both with the materials used in its construction and the logistics of the program.

LEED (Leadership in Energy and Environmental Design) for Homes, sponsored by the U.S. Green Building Council (USGBC), “is an initiative designed to promote the transformation of the mainstream homebuilding industry toward more sustainable practices” (USGBC, 2008, p. iv). These standards can be used as a guideline to incorporate sustainable features into the design of the new cottage. LEED for Homes measures the performance of a home in eight categories: Innovation &

Design Process (ID), Location & Linkages (LL), Sustainable Sites (SS), Water Efficiency (WE), Energy & Atmosphere (EA), Materials & Resources (MR), Indoor Environmental Quality (EQ), and Awareness & Education (AE). The following are examples of how the cottage design applies to select LEED requirements. Modular construction inherently decreases the amount of construction waste since it is built in a factory (MR 3: Waste Management). Because the cottage will be removed once the resident no longer lives there, and because the cottage is placed on stilts above the site, there is minimal impact to the land; the only damage done to the land is from the stilts (SS 1: Site Stewardship). Since the cottage can use the existing infrastructure from the main house, it is not necessary to place new sewer and water supply lines (LL 4: Infrastructure). The landscaping is determined by each individual resident; they should be encouraged to plant indigenous trees and plants that provide appropriate shading for the cottage on their particular site (SS 2: Landscaping). Because each cottage is placed differently on each site, it would be difficult to incorporate solar design.

Other sustainable features which should be incorporated into the new design include, water-efficient fixtures, including faucets, showers and toilets (WE 3: Indoor Water Use). Insulation should be installed to minimize heat transfer and thermal bridging (EA 5: Heating and Cooling Distribution System). The energy performance of windows should be maximized (EA 4: Windows), and compact fluorescent light bulbs should be used to reduce energy consumption (EA 8: Lighting). Additionally, installing Energy Star appliances would reduce energy consumption (EA 9: Appliances). Materials used in the construction should minimize waste especially in framing materials (MR 1: Material-Efficient Framing). Moisture control is important, something that is controlled for in the factory during modular construction (EQ 3: Moisture Control). Additionally, choosing building materials manufactured within the

region is beneficial. Finding a factory which produces cottages within 500 miles also reduces transportation costs (MR 2: Environmentally Preferable Products) (USGBC, 2008). These are some of the LEED for Home requirements; all prerequisites and credits are listed in the LEED for Homes Rating System which can be found on the USGBC website (www.usgbc.org).

One specific design element which should be sustainably designed is the flooring. Currently, there are vinyl floors in the kitchen and bathroom of the cottage. While vinyl flooring may be a good choice due to its ease of maintenance, it is not the best environmentally-friendly material. A different material such as cork or linoleum would be a better choice. Additionally, cork provides a soft walking surface as opposed to vinyl. This discussion of variables to consider in selecting sustainable flooring illustrates the complex set of tradeoffs that must be weighed when sustainability is factored into redesigning the cottage.

If the cottages are built to incorporate LEED standards, the utility costs would decrease, specifically for electric heating and through the use of Energy Star appliances. The design could incorporate features that provide for better insulation; the residents noted that it feels as though the cottage is not well insulated especially in the winter. Additionally, there are health benefits to increasing the insulation and making the home warmer (Thomson, Thomas, Sellstrom, & Petticrew, 2009).

While the materials used to build the cottage should be sustainable, the ECHO concept should be sustainable in itself. The cottage has a longer life-cycle because the same one is used by multiple residents. Because of this, however, it is important that the cottage is built to withstand multiple moves. Additionally, incorporating design features which adapt to different users allows it to be utilized longer than one which is not adaptable. Deciding what will happen to each cottage once they are no longer needed is important as well, for example, if the elder cottage program were to be

discontinued. It could either be used for some other purpose, or the cottage could be sent back to the factory to be broken down and made into something else. It is important that the cottage does not end up in the landfill.

Most modular homes are built in the factory and brought to one site to permanently sit; this is where the difference between an elder cottage and a regular modular home exist. Therefore, if the design of the cottage can be built to be accessible for all users, it is more important to understand how the cottage can be moved from site to site without compromising structural integrity.

Example: FabCab.

FabCabs are also built to be sustainable, as they are described as eco-friendly and economically resourceful units. Similar to elder cottages, the FabCab can be moved to a new location at a later date (FabCab, 2010). The FabCab is not only marketed as an in-law apartment, but also as an office, studio or a backyard escape, making the same cottage usable for different purposes. Specifically, the FabCab includes an open floor plan which maximizes floor space, renewable resources are used in its construction and there is less waste because of the way it is constructed by using energy efficient structural insulated panels (SIPs). Again, the FabCabs can be reused for purposes other than that for which they were purchased making them not only sustainable in their construction, but sustainable in their life cycle as well.

These same concepts should be integrated into the new design of the elder cottage, as previously discussed. The FabCab shows how these concepts have been implemented in other successful products, demonstrating the ease with which sustainability concepts can be implemented.

Transportability/structural stability.

As previously stated, if the cottage is built following the principles of universal design allowing it to be mass produced, construction cost would be reduced. The

remaining issue, one that has significant cost and performance implications, is how to design these modular homes so they can be transported multiple times without losing their structural integrity.

The current elder cottages fall under the construction category of modular housing. Modular housing is one of the fastest-growing segments of the construction industry; its production increased 48% from 1992 to 2002. Modular homes provide “lower costs, speedy construction, excellent craftsmanship, and quality building products in a controlled setting” (Maynard, 2008, p. 141). This type of construction can save 10-20% of the cost of a stick-built home, and 65% savings in time. Modular homes are built in a factory and are brought to the site 90% complete. It is important for BHTC to choose a modular housing manufacturer that provides the best quality work, not necessarily the lowest price (Maynard, 2008).

Most modular homes are built to be brought to one site and remain at that location. This is different than an elder cottage which needs to be transported from site to site. Because of this, the lifting straps for a crane to load and unload modular housing units with each move are left in place, and the cottage is not permanently connected to the foundation (M. Sickel, personal communication, April 29, 2010).

With a modular home, the foundation needs to be extremely precise. Since the cottage is built in the factory, it is built to be perfectly square; therefore the foundation at each site needs to be perfectly square as well. Additionally, the foundation must support the cottage for as long as possible without settling over time, as two of the residents have been living in their cottages for over twelve years.

The largest cost for reassembly of the cottages at each site is the need for a crane to place the modules onto the foundation. Therefore, an alternative needs to be created to eliminate the need for a crane to piece the cottage together.

A HUD ECHO evaluation called for attention to the issue of relocating cottages (Koebel, Beamish, Danielsen-Lang, & Steeves, 2003) stating that: (1) “a national ECHO program should include detailed specifications for portability in the design of units, as well as detailed procedures for relocating units,” and (2) “HUD should consult with the factory-built or modular/manufactured housing industry to identify and incorporate design specifications maximizing portability at the lowest possible cost. Optimum designs should be tested for cost and repair implications with repeated disassembly, transport, and reassembly” (p. 61). To avoid what is considered to be the main threats to the ECHO program, there needs to be innovative thinking about transportability options.

One approach worth studying would be to use flatbed trailers to transport the modules to the site and place the modules onto the same type of foundation the current cottage uses, without the need for a crane. The flatbeds then could be taken away and returned when a cottage is to be relocated. Elimination of the crane, which requires a significant amount of space to maneuver, would increase the number of acceptable sites for placement of cottages. This innovative concept would not be difficult to execute with the proper equipment. It would require a construction expert to determine how to properly execute this specific task.

Thinking creatively about alternatives for how to relocate the elder cottages requires attention to highway transportation limitations imposed by each state such as size constraints. Section 385 of the New York State Vehicle and Traffic Law states that a vehicle can be no more than 96 inches wide, and 13.5 feet high (New York State Department of Transportation [NYSDOT], 2010). A special hauling permit is needed if these dimensions are surpassed; however, the absolute maximum width is 16 feet and 14’6” in height. Additional costs incur if a special permit is needed because escorts are required to drive along with the oversized load. While these are the

regulations in New York State, the regulations of other states through which the cottages would be transported need to be considered. Since there are no modular home factories in NYS, it is necessary to have the cottage shipped from Pennsylvania. Therefore, the Pennsylvania requirements need to be met as well.

If the new design allows the elder cottage to be constructed with smaller modules, then it may be possible for the cottage to come to the site in smaller components on a flatbed trailer. This would decrease the transportation costs and the cottage dimensions would not have to be dictated by the height and width highway regulations. However, smaller modules may require longer assembly times at each site, similar to the FabCab, as it may take a few months to construct on the site.

Example: FabCab.

While the FabCab may take longer to construct, its construction techniques provide an alternative for how the elder cottage could be constructed. Once the foundation and timber frame is in place, the SIPs which make up the FabCab can easily be assembled because they are all cut to size in the factory. The SIPs decrease the amount of time needed to insulate the home since insulation is built into the panels. This construction technique may take longer than the one currently in place for BHTC's elder cottages, but it ensures that the cottages are well insulated, helping to maintain the temperature within the cottage even in the cold months.

The transportability and structural stability of the cottages is a major concern for BHTC's elder cottage program. If the cottages lose their structural stability with each move, they would not provide a safe environment for residents. Placing the cottages on the site without the use of a crane would hopefully decrease the relocation costs of the units, enabling more moves to occur with BHTC's remaining funds for this program. Professional builders and engineers need to be consulted to determine the feasibility and implementation of the proposed solutions.

Zoning regulations.

As previously discussed, zoning regulations have often created obstacles in the implementation of ECHO programs. In New York State, each municipality, including cities, towns and villages, set up their own zoning regulations. In Tompkins County, most municipality zoning codes allow for the placement of ECHO units. Therefore, if the property has enough land to accommodate the unit, zoning regulations do not necessarily become the threat that was predicted in BHTC Strategic Plan (BHTC, 2009a). One problem which does arise in most cases is that the cottage needs to be placed closer to the property line than is permissible in the setback requirements; therefore, families need to get a variance from the zoning board to allow the cottages to be set closer to the property line, in some cases as close as five feet (J. Jurkowich, personal communication, July 29, 2010).

Although each municipality has its own standards, the Tompkins County Planning Department has created model zoning ordinances which most municipalities in Tompkins County use to allow for elder cottages. The Deputy Commissioner of Planning at the Tompkins County Planning Department shared the sample regulations the department is developing specifically for the Village of Trumansburg, where one BHTC elder cottage is currently located. The cottages are referred to as “care cottages” instead of elder cottages, allowing the cottage resident to be either “55 years of age or older, or persons with infirmities” (J. Jurkowich, personal communication, July 29, 2010). Additionally, the resident must be either “a parent or grandparent, legal dependent, or next of kin of one of the owners and occupants of the principal dwelling unit on the lot” (J. Jurkowich, personal communication, July 29, 2010). The cottages need to be easily removable, and be between 250 and 750 square feet and no more than 20 feet in height. The draft regulations also specify cottage location requirements on the property, the building requirements, the duration of placement of

the cottage including how long it can remain in the property after the occupant's death (120 days), as well as application requirements.

While originally thought to be a major obstacle in implementing the ECHO program, the Tompkins County Planning Department has made it so that zoning regulations do not interfere with the implementation of the program. While residents may have to obtain special use permits or a variance to allow the cottage to be placed on their property, these have been relatively easy for residents to obtain. Therefore, zoning regulations do not affect the use of elder cottages in Tompkins County.

Conclusion

As previously discussed, the current elder cottage residents are very pleased with their homes. Looking at the cottages from an interior design point of view, focusing on creating successful housing for the older population, many of the current design elements could be better executed to create a safer living environment. Integrating the principles of universal design would enhance the livability of the home and allow it to adapt to the changing needs of the residents. Using the FabCab and MEDCottage as inspiration, the new elder cottage should include accessible features that adapt to each user, allowing the residents to maintain a high quality of life and independently perform ADLs and IADLs. Incorporating sustainable materials and techniques into the design of the cottage allows it to be a healthier space for the resident and for the environment. Creating an innovative way for the cottages to be transported would cut down on costs and possibly create a more structurally sound cottage which can be easily transported from site to site. By consulting expert designers, engineers and builders, the design of Better Housing for Tompkins County's elder cottages could be greatly improved for resident comfort and safety.

Study Limitations

There were some limitations to this study. Since this is an evaluation of the design of the current elder cottages used by BHTC, only four cottages were researched, each with the same design. It may have been helpful to speak with previous cottage residents and families to get the opinion of those who have already experienced living in or next door to the cottage.

Since only two visits were made to each cottage to speak with the residents, the researcher did not fully experience the daily routines of each resident. Additional visits would have helped to understand exactly how the cottages are used by each resident and how they interact with the cottage design without the researcher being present. Because of time constraints both for the researcher and the residents, additional visits were not possible.

It also would have been beneficial to compare the cottages used by BHTC with cottage designs in other communities. While other cottages were researched through the literature review, published studies did not include resident or family opinions about the design of the cottages.

Policy Implications

This evaluation of Better Housing for Tompkins County's elder cottages shows that the elder cottage program can greatly enhance the lives of those utilizing the program. Therefore, continued support of the program by BHTC and COFA are recommended to help ensure continuation of the program. While the initial funding for this program is diminishing, the design suggestions found in this discussion section are important to help maintain the residents' independence. If funding does not permit implementation of completely new cottages, some of the alterations discussed could be made to the existing cottages. BHTC may seek the assistance of local builders to make some simple modifications to the cottages, possibly at little to no cost, to ensure

the safety of the residents. While the residents may not complain about certain features, the modifications presenting in this Discussion can help improve residents' quality of life. Because the need for safe and affordable housing is increasing among older adults due to the boom of this population, the issues discussed in this thesis should be at the forefront of issues to be looked at now and in the future by New York legislators.

APPENDIX A

Excerpt from Better Housing for Tompkins County's Strategic Plan (BHTC, 2009c, p. 27-28).

7. Evaluate Elder Cottage Housing Options (ECHO)

SWOT:

STRENGTHS <ul style="list-style-type: none"> •Established portfolio of affordable rental elderly housing with project based Section 8 subsidy •History of well managed program delivery •Partnership with COFA which administers wait list •Program uniquely meets housing needs •Local resources to help design new movable unit design 	WEAKNESSES <ul style="list-style-type: none"> •Existing modular homes not built to move •Existing modular homes are aging •DHCR does not want standard trailers, and better model has not been discovered •Limited staff to research new unit design which may require extensive time •Clustering units would change program mission •Clustering units would require full maintenance
OPPORTUNITIES <ul style="list-style-type: none"> •Program attracts interest •Applicant interest and wait list has grown •Units could be moved to same property as new BHTC office if built •Sale of units may produce revenue for BHTC 	THREATS <ul style="list-style-type: none"> •TCA may not renew annual subsidy contract •DHCR/ HOME restricts program options •Government funding decreasing •Cost of building materials increasing •Zoning laws may create obstacles •NIMBYism •Lenders limiting loans

NEED: As noted elsewhere, the *Affordable Housing Needs Assessment*, states that an additional 3000 units are required to meet new housing needs. Households aged 45 and above, including senior citizens, are singled out as the source of the largest rates of increase in demand for owner-occupied units. While the majority of these households may stay in their current homes, large numbers will require specialized or downsized housing. The ECHO program was created to address the specialized housing need of seniors who wish to remain independent by living on the property of their relatives in a comfortable, modular rental home. The original concept was to move the units from site to site, as needed. Their design, however, makes moving these units prohibitively expensive.

GOAL:

1. Review the financial viability of the Elder Cottage program

IMPACT: Elderly people and their families in Tompkins County will have more affordable housing choices available to them.

ACTIONS:

Action Item	Cost	Funding Source	Impact
1A. Determine what DHCR will allow in terms of program modification	\$0*	Current management fee income	
1B. Perform a cost/benefit analysis that addresses whether the program	\$0*	Current management fee income	

meets needs for which it was designed			
1C. Decide the future of program	\$2,500	Foundation grant	The design flaws will be addressed and the program's future decided

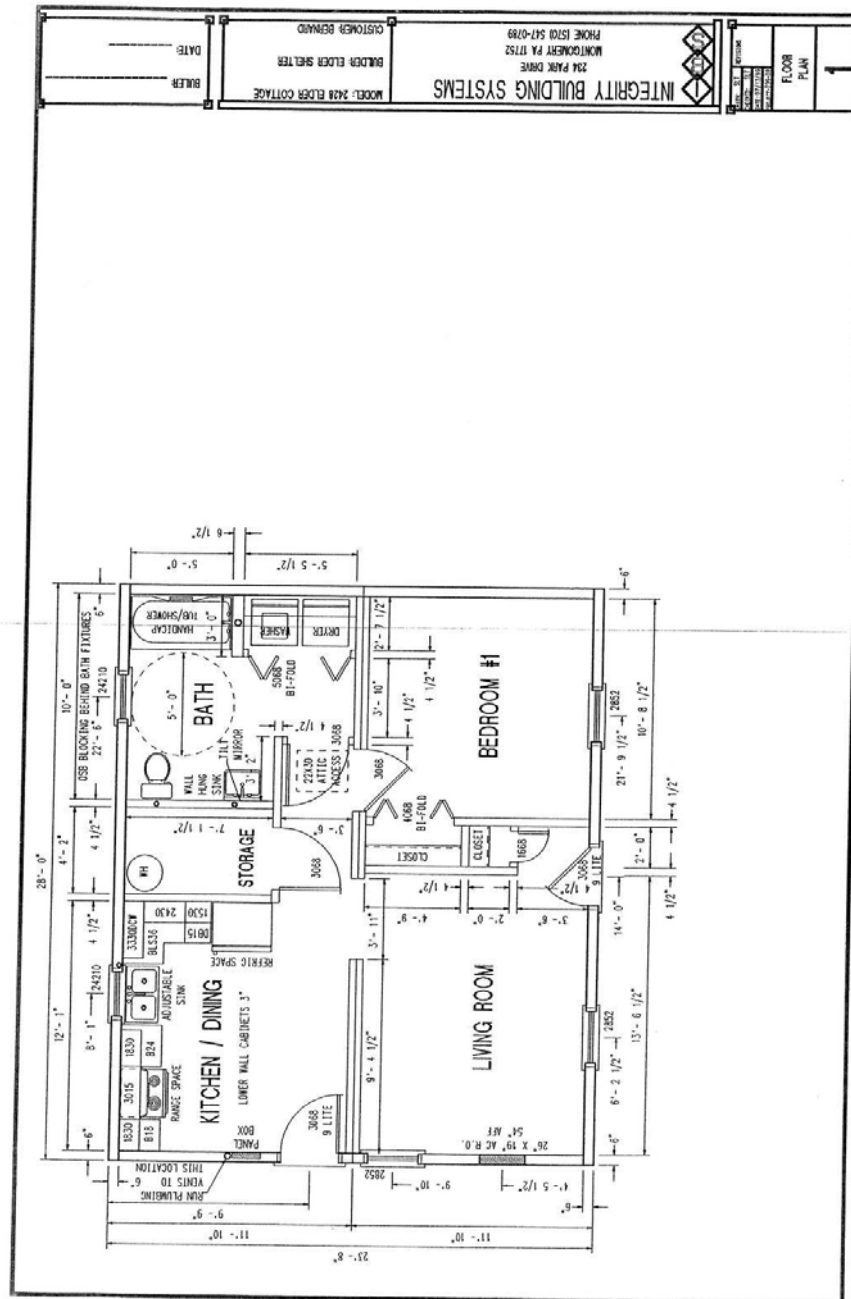
*where \$0 appears will require staff time but no additional funding

EVALUATION:

<i>Action Item</i>	<i>Evaluation Method</i>	<i>Timeline</i>
1A	What solution was recommended by DHCR?	Year 1
1B1	Was the cost/benefit analysis completed?	Year 1
1B2	What are the conclusions of the cost/benefit analysis?	Year 1
1C	What plan was developed for the future of the program?	Year 1

APPENDIX B

Detailed ECHO floor plan, received from Andrew Piliero, former Property Manager at BHTC.



APPENDIX C

Approval from IRB at Cornell University.



Cornell University
Office of
Research Integrity and Assurance

East Hill Office Building, Suite 320
395 Pine Tree Road
Ithaca, NY 14850
p. 607-255-5138
f. 607-255-0758
www.irb.cornell.edu

Institutional Review Board for Human Participants

NOTICE OF EXPEDITED APPROVAL

To: Joelle Lichtman
From: Jenny Gerner, IRB Chairperson
Protocol ID#: 1003001283
Project(s): Evaluation of Better Housing for Tompkins County's Elder Cottages
Date of Approval: April 10, 2010
Expiration Date: April 09, 2011

The above-referenced protocol has been reviewed and given expedited approval by the Institutional Review Board for Human Participants (IRB) for the inclusion of human participants in research. **This approval shall remain in effect until April 09, 2011.**

The terms of Cornell University's Federalwide Assurance (FWA) with the federal government mandate the following important conditions for investigators:

1. All consent forms, records of study participation, and other consent materials **must** be held by the investigator for **five years** after the close of the study.
2. Investigators must submit to the IRB any **proposed amendment** to the study protocol, consent forms, interviews, recruiting strategies, and other materials. Investigators may not use these materials with human participants until the IRB has reviewed them. For information about study amendment procedures and access to the Amendments application form, please refer to the IRB website: <http://www.irb.cornell.edu/forms>.
3. Investigators must promptly report to the IRB any **unexpected events** involving human participants. The definition of prompt reporting depends upon the seriousness of the unexpected event. For guidance on recognizing, defining, and reporting unexpected events to the IRB, please refer to the IRB website: <http://www.irb.cornell.edu/forms>.

If the use of human participants is to continue beyond the assigned approval period, federal requirements mandate that the protocol be re-reviewed and receive an updated approval. **You may not continue to use information collected from human participants beyond the stated approval period without an updated approval.** Please note that the terms of our FWA with the federal government do not allow for an extension of this period without review. Continuing without an updated approval constitutes a violation of University policy and federal regulations. Research funds administered by the Office of Sponsored Programs will not be released to any project that does not have a current IRB approval.

Federal regulations require that all research be reviewed at least annually. As the Principal Investigator it is your responsibility to obtain review and continued approval **before** the expiration date. Applications for renewal of approval must be submitted sufficiently in advance of the expiration date to permit the IRB to conduct its review before the current approval expires. Please allow three weeks for the review.

APPENDIX D

Contact letter sent to each resident.



Cornell University

Human Ecology
Design and Environmental Analysis
Martha Van Rensselaer Hall
Ithaca, New York 14853

Hi

My name is Joelle Lichtman and I am a graduate student in the department of Design and Environmental Analysis at Cornell University. I am conducting a study which will evaluate Better Housing for Tompkins County's Elder Cottages. I received your contact information from Andrew Piliero at Better Housing.

For this study, I would like to schedule three times when I could come visit your cottage. During the visits I would like to talk with you and some of your family members about the strengths and weaknesses of the design of the cottage. I would also like to observe how you use the different areas of your cottage. Each visit will be very informal and will last about one hour. Photographs of the cottage and voice recordings will be taken, with your permission, during the visits. For your participation, you will receive a gift certificate in the amount of \$50.

If after receiving this letter you have any questions about this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact me at 631-220-5429 or at J.L.L58@cornell.edu. Please talk this over with your family to see if they are willing to participate in this study as well. I will call you within the next week to further discuss this research and schedule meeting times.

I would like to assure you that this study has been reviewed and approved by the International Review Board at Cornell University.

Thank you in advance for your interest in this project.

Sincerely,

Joelle Lichtman

Cornell University is an equal opportunity, affirmative action educator and employer.

APPENDIX E

Consent form signed by all participants.

Evaluation of Better Housing for Tompkins County's Elder Cottages

You are being asked to take part in a research study evaluating Better Housing for Tompkins County's Elder Cottages. Please read this form carefully and ask any questions you may have before agreeing to take part in the study.

What the study is about: This study is an evaluation of the design of Better Housing for Tompkins County's Elder Cottages.

What will be asked of you: Participants in the study will be asked to take part in an interview about the Elder Cottage. With your permission, interviews will be voice recorded to ensure accuracy. The residents will also be asked to walk around the home with the researcher to look at various design aspects of the cottage. Photographs may be taken of the cottage for the researcher's records. To complete these tasks, the researcher will make three visits to the cottage with each visit lasting approximately one hour.

Risks and benefits: There are no risks to participating in this study. The findings of this research are to improve the design of Better Housing for Tompkins County's Elder Cottages, and may offer benefit to similar programs around the country.

Compensation: Each cottage resident will receive a gift certificate for \$50.

Your answers will be confidential. The records of this study will be kept private. In any sort of report which is made public, it will exclude any information that will make it possible to identify you. Only the researchers will have access to the records. Any photographs will be kept confidential and will only be used with the resident's consent. Voice recordings will be deleted once they are transcribed.

Taking part is voluntary: Taking part in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide not to take part, it will not affect your current or future relationship with Cornell University or Better Housing for Tompkins County. If you decide to take part, you are free to withdraw at any time.

If you have questions: The researchers conducting this study are Joelle Lichtman, graduate student, and Professor Paul Eshelman. Please ask any questions you have now. If you have questions later, you may contact Joelle Lichtman at JLL58@cornell.edu or at 1-631-220-5429. You can reach Professor Eshelman at PEE2@cornell.edu or 1-607-255-1811. If you have any questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at 1-607-255-5138 or access their website at <http://www.irb.cornell.edu>. You may also report your concerns or complains anonymously through Ethicspoint or by calling toll free at 1-866-293-3077. Ethicspoint is an independent organization that serves as a liaison between the University and the person bringing the complaint so that anonymity can be ensured.

You will be given a copy of this form to keep for your records.

Statement of Consent: I have read the above information, and have received answers to any questions I asked. I consent to take part in this study.

Your Signature _____ Date _____

Your Name (printed) _____

In addition to agreeing to participate, I also consent to having photographs taken of the cottage.

Your Signature _____ Date _____

I consent to having photographs used in future publications.

Your Signature _____ Date _____

I consent to having the interviews be voice recorded.

Your Signature _____ Date _____

Signature of person obtaining consent _____ Date _____

Printed name of person obtaining consent _____ Date _____

This consent form will be kept by the researcher for at least three years beyond the end of the study and was approved by the IRB on April 10, 2010.

APPENDIX F

Dates of resident interviews, family interviews and observations.

	resident interview	family interview	observations
resident A	May 10, 2010	May 17, 2010	May 20, 2010
resident B	May 10, 2010	May 19, 2010	May 25, 2010
resident C	May 13, 2010	May 18, 2010	May 18, 2010
resident D	June 22, 2010	June 24, 2010	June 29, 2010

APPENDIX G

Interview script for residents.

What were the reasons behind moving into the cottage?

How long have you been living here? When do you think you will move out?

What family members live in the main home? How often do you see them?

Where do your other family members live? How often do you hear from them?

Have you had any sensory changes that change the way you interact with the environment?

Visual/auditory?

What are the strengths and weaknesses of the cottage?

Living Room?

Kitchen?

Bedroom?

Bathroom?

Overall, how would you rate the cottage? [bad 1 2 3 4 5 good]

Are you satisfied/dissatisfied with the cottage? [bad 1 2 3 4 5 good]

Accessibility.

How easy is it to move around within the cottage?

Do you feel that your home is flexible and can easily be rearranged?

How did you decide how to arrange the furniture in each room?

Are you satisfied with the current arrangement?

How often (if ever) do you move furniture around?

Is there enough space to perform daily activities?

Cooking?

Bathing?

Socializing?

Sleeping?

Grooming?

Although the original cottage was designed to be handicap accessible, what kinds of changes have you made to make the cottage more accessible for your needs?

Are you able to access all areas of the cottage? If not, how do you get to those items?

How satisfied are you with the function and appearance of the following:

Furniture

Built in features (cabinets, windows, bathroom)

Lighting

Finishes (paint color, carpeting, flooring materials, cabinetry)

Equipment (kitchen appliances)

Hardware (handrails, door knobs)

Fixtures (bath tub, toilet and other plumbing fixtures)

Utilities (room temperature, water temperature)

How easy is it to ascend and descend the stairs and ramp?

Ability to maintain high quality of life.

How often do visitors come to the cottage?

Family, aids, neighbors, etc.

Are windows easy to open?

Are you able to control the lighting levels within the cottage?

How is the temperature regulated within the cottage?

How comfortable is the heating system in the cottage for a typical winter?

Summer?

Do you use extra heaters?

Do you stay in the main home if the cottage gets too hot/cold?

Do you feel like the cottage provides a sense of home? Do you feel as if it is your own?

What type of positive distractions do you enjoy the most?

Nature

Hobbies

TV

Music

Computer/internet

Does the cottage enhance your quality of life?

Does the cottage enhance your interaction with your family?

Have you seen any changes before and after living in cottage?

Do you have privacy living in the cottage?

Do you use any community services?

What type of activities do you participate in?

Inside the cottage (hobbies) and outside (volunteer)

Ability to support ADLs.

Can you easily perform daily activities around the house?

Toileting, bathing, dressing, eating, transferring, moving around, etc.

What design features help you/prohibit you from performing these activities?

Affordability.

How affordable is it to live in your cottage?

Are the costs associated with living in the cottage within your means?

Was cost an issue when deciding to move into the cottage?

Sustainability.

What type of features would you like to see incorporated into the design of the cottage?

Transportability/Structural Stability.

Does the cottage feel stable? Solid? Well built?

Interview script for secondary users.

What were the reasons behind deciding to rent the cottage?

How long has it been here?
How often do you visit the cottage?
Age of parent?

Overall, how would you rate the cottage?
Are you satisfied/dissatisfied with the cottage?

Affordability.

How affordable is the monthly expenditure for the cottage?

- Rent
- Utilities
- Maintenance
- Cleaning

Are the costs associated with having the cottage within your means?
Was cost an issue when deciding to purchase the cottage?

Accessibility. What are your observations of accessibility for the resident:

Is there enough space for the resident to perform daily activities?

Although the original cottage designed to be handicap accessible what kind of changes have you made to make the cottage more accessible for your needs?

What kind of tasks do you help out with in the cottage?

How satisfied are you with the function and appearance of the following:

- Furniture
- Built in features (cabinets, windows, bathroom)
- Lighting
- Finishes (paint color, carpeting, flooring materials, cabinetry)
- Equipment (kitchen appliances)
- Hardware (handrails, door knobs)
- Fixtures (bath tub, toilet and other plumbing fixtures)
- Utilities (room temperature, water temperature)

Is there enough space in the cottage for...

- Cooking?
- Bathing?
- Socializing?
- Sleeping?

How easy is it to ascend and descend the stairs and ramp?

Do you feel the resident is able to move around without any troubles? If not, which areas pose problems?

Ability to maintain high quality of life.

How often does the resident visit the main house?

How are the lighting levels regulated within the cottage?

How is the temperature regulated within the cottage?

Are windows easy to open?

Do you feel like the cottage provides a sense of home?

Does the cottage enhance the resident's quality of life?
Does the cottage enhance interaction within the family?
Do you feel the cottage is in good condition?

Ability to support ADLs.

Which ADL of the resident do you help with?

- Personal hygiene
- Dressing and undressing
- Eating
- Transferring from bed to chair, and back
- Toileting
- Moving around

Sustainability.

Are the cottages built with any sustainable features?
What type of features would you like to see incorporated into the design of the cottage?

Transportability/Structural Stability.

After being moved to your property, does the cottage feel stable?

APPENDIX H

Gerontological Environmental Modifications: Environmental Assessment. (Bakker, 2005)

CORNELL
UNIVERSITY

Joan and Sanford I. Weill
Medical College

GEM

Environmental Assessment

Gerontological Environmental Modifications

Rosemary Bakker, MS, ASID
Weill Medical College of Cornell University
Division of Geriatrics and Gerontology
rob2013@med.cornell.edu
www.cornellEG.org

www.cornellEG.org

1

How to Use The GEM Environmental Assessment

This comprehensive home assessment tool identifies both problems and possible solutions for each room of the dwelling unit and the immediate outdoor area. The assessment covers a broad range of environmental features, including accessibility, furniture, flooring, lighting, etc. You can use it as a basic resource for specific problems or certain areas within the environment, or to conduct a full assessment.

Throughout the assessment, there is a "(T)" for "trigger" next to specific activities. A "No" response to any of the trigger questions (T) may be indicative of functional or physical deterioration and may require additional action. Depending on the situation, you may need to contact a health professional, including a primary physician or nurse, request a functional assessment, and/or request equipment from a physical and/or occupational therapist.

We hope you find the GEM assessment tool useful in making environmental changes in your client's dwelling.

Table of Contents

Living Room	3-4
Bedroom	5-7
Hallways	8
Bathroom	9-10
Kitchen	11-12
Indoor Stairs	13
Outdoors	13
Other	14
Follow-Up	15

GEM Environmental Assessment

Living Room

Client Uses Living Room Y__ N__

Accessibility

Client moves in/out & through room without bumping/tripping into anything (T) Suggestions: remove doorsill __, door frame __, door __, or clutter __ install offset hinges __ re-arrange furniture __ other __ Resource:	Y__ N__ NA__
--	--------------

Flooring

Lamp, extension & telephone cords are located outside of walking path Suggestions: furniture re-arranged __ cords relocated __ outlets installed or repaired __ other __ Resource:	Y__ N__ NA__
Area rugs in walking path are taped to floor with double-sided tape or have a non-skid pad Suggestions: tape rugs to floor __ purchase non-skid pad __ remove rugs __ other __ Resource:	Y__ N__ NA__
Flooring is free from rips & holes Suggestions: flooring removed/repaired __ other __ Resource:	Y__ N__ NA__

Furniture

Client uses furniture for support while ambulating (T) If Yes Suggestions: cane/walker __ furniture replaced/repaired __ castors removed __ other __ Resource:	Y__ N__ NA__
Low tables or ottomans are located out of walking path for person with low vision Suggestions: low lying furniture removed/replaced __ other __ Resource:	Y__ N__ NA__
Table tops & floor are free of excessive clutter (answer no for either case) Suggestions: furniture needed __ baskets needed __ clutter reorganized __ other __ Resource:	Y__ N__ NA__

Lighting (turn on all lights)

Lighting is adequate to client (make recommendations if there are significant dark areas with lights on) Suggestions: new light bulbs ___ lamp(s) repaired ___ new lamp(s) ___ lamp(s) relocated ___ other ___ Resource:	Y___ N___ NA___
Client has lamp(s) nearby main seating area Suggestions: fixture relocated ___ new fixture ___ other ___ Resource:	Y___ N___ NA___
Client can easily turn lights on/off Suggestions: switch or outlet replaced/repaired ___ table top pad switch or touch turn-on adaptor ___ other ___ Resource:	Y___ N___ NA___

Seating

Seating has firm seat that doesn't sag, arm rests on both sides (for chairs) & not too low or deep Suggestions: new chair ___ extender legs ___ seat or back cushion restuffed ___ or replaced ___ other ___ Resource:	Y___ N___ NA___
If wheelchair is used, it has a pressure relief seat cushion (not patient's own seat pillow) (T) Suggestions: Contact doctor for prescription ___ other ___ Resource:	Y___ N___ NA___

Windows & Shades

Client easily opens/closes at least one window & all blinds or shades Suggestions: reduce tension in window frame rods ___ remove paint on window casing ___ reorganize furniture ___ shades or blinds fixed ___ new shades/blinds ___ furniture relocated ___ other ___ Resource:	Y___ N___ NA___
--	-----------------

Bedroom

Client Uses Bedroom Y__ N__

Accessibility

Client moves in/out & through the room without bumping/tripping into anything Suggestions: remove: doorsill __, door frame __, door __, or clutter __ install offset hinges __ re-arrange furniture __ other __ Resource:	Y__ N__ NA__
---	--------------

Bed

Sitting on edge of bed, client's thighs are parallel with floor, with feet firmly on floor Suggestions: lower bed: remove castors __ cut wooden frame __ order new 3" frame __ Raise bed: new 7" frame __ leg extenders __ other __ Resource:	Y__ N__ NA__
Client has a handle to help get in & out of bed if needed (T) Suggestions: new handrail __ other __ Resource:	Y__ N__ NA__
Bedcovering hangs above the floor Suggestions: hem bedcovering __ new bedcovering __ other __ Resource:	Y__ N__ NA__
Hospital bed only: There is minimal spacing between mattress & siderails Suggestions: contact home care agency __ replace bed, mattress or rails __ other __ Resource:	Y__ N__ NA__
Mattress is supportive & does not sag when sat on (assessor: ask client if you can sit on bed to test) Suggestions: replace mattress __ other __ Resource:	Y__ N__ NA__
Bedside commode available if nighttime trips to bathroom are difficult (T) Suggestions: Doctor to prescribe commode __ other __ Resource:	Y__ N__ NA__

Communication

Telephone next to bed is usable by client Suggestions: large print dial overlay ___ new phone/large type ___ hearing impaired phone or flashing light adaptor ___ voice activated service ___ furniture rearranged ___ other ___ Resource:	Y___ N___ NA___
Doorbell can be heard by client in bedroom Suggestions: plug-in remote doorbell ___ doorbell with flashing light ___ other ___ Resource:	Y___ N___ NA___

Flooring

Lamp, extension & telephone cords are located outside of walking path Suggestions: furniture re-arranged ___ cords relocated ___ outlets installed or repaired ___ other ___ Resource:	Y___ N___ NA___
Area rugs in walking path are taped to floor with double-sided tape or have a non-skid pad Suggestions: tape rugs to floor ___ purchase non-skid pad ___ remove rugs ___ other ___ Resource:	Y___ N___ NA___
The flooring is free from rips & holes Suggestions: carpet removed/repared ___ flooring patched ___ other ___ Resource:	Y___ N___ NA___

Furniture & Storage

Furniture is stable for support if client holds or leans on while ambulating (T) Suggestions: cane/walker ___ furniture replaced/repared ___ castors removed ___ other ___ Resource:	Y___ N___ NA___
Doorknobs/furniture knobs are easy-to-use Suggestions: Install "C" shaped handles ___ textured hand grip over doorknobs ___ lever adaptor ___ other ___ Resource:	Y___ N___ NA___
Floors & tabletops are free of clutter Suggestions: clutter organized/removed ___ new dresser/night table ___ drawers repaired ___ other ___ Resource:	Y___ N___ NA___

Closet clothing is accessible without client standing on tiptoes or chair Suggestions: hanging pole lowered ___ clothing rearranged ___ new door or door removed ___ hanging shoe bag ___ stepstool with handle ___ other ___ Resource:	Y__ N__ NA__
---	--------------

Lighting (turn on all lights)

Pathway to bathroom is lit at night (by nightlights, flashlight or light left on) Suggestions: install automatic nightlights ___ battery sensor light ___ lighted switchplate ___ other ___ Resource:	Y__ N__ NA__
Light switch at door entrance or light left on Suggestions: wireless switch ___ switch repaired ___ other ___ Resource:	Y__ N__ NA__
Bedside lamp(s) is usable by client Suggestions: new lightbulb ___ lamp(s) repaired ___ new lamp(s) ___ lamp(s) moved ___ tabletop pad switch ___ or touch turn-on ___ switch repaired or installed ___ other ___ Resource:	Y__ N__ NA__
Lighting is adequate to client (make recommendations if there are significant dark areas with lights on) Suggestions: new light bulbs ___ lamp(s) repaired ___ new lamp(s) ___ lamp(s) relocated ___ other ___ Resource:	Y__ N__ NA__

Seating

Chair is easy to get in/out of, firm seat, not too deep or low, arms on both sides (T) Suggestions: new chair ___ leg extenders ___ back or seat cushion refilled ___ or replaced ___ other ___ Resource:	Y__ N__ NA__
If wheelchair is used, it has a pressure relief seat cushion (not patient's own seat pillow) (T) Suggestions: Contact doctor for prescription ___ other ___ Resource:	Y__ N__ NA__

Windows

Client can easily open/close at least one window Suggestions: reduce tension in window frame rods ___ remove paint ___ reorganize furniture ___ other ___ Resource:	Y__ N__ NA__
Client can easily open/close blinds or shades Suggestions: shades/blinds fixed ___ new shades/blinds ___ furniture relocated ___ other ___ Resource:	

Hallway

Client Uses Hallway

Y__ N__

Location: _____

Hallway lighting is adequate to client (make recommendations if there are significant dark areas with lights on) Suggestions: new light bulbs __ new fixture __ automatic sensor switch __ lighted switch __ Resource:	Y__ N__ NA__
Hallways are free from clutter & flooring is free of rips & holes Suggestions: remove clutter __ flooring to be removed __, replaced __, or repaired __ Resource:	Y__ N__ NA__
Area rug is taped to floor with double-sided tape or has non-skid pad Suggestions: tape rug to floor __ purchase non-skid pad __ remove rug __ other __ Resource:	Y__ N__ NA__

Hallway (ask client if you can turn on lights)

Location: _____

Hallway lighting is adequate to client (make recommendations if there are significant dark areas with lights on) Suggestions: new light bulbs __ new fixture __ automatic sensor switch __ lighted switch __ Resource:	Y__ N__ NA__
Hallways are free from clutter & flooring is free of rips & holes Suggestions: remove clutter __ flooring to be removed __, replaced __, or repaired __ Resource:	Y__ N__ NA__
Area rug is taped to floor with double-sided tape or has non-skid pad Suggestions: tape rug to floor __ purchase non-skid pad __ remove rug __ other __ Resource:	Y__ N__ NA__

Bathroom

Client Uses Bathroom Y__ N__

Accessibility

Client can get in/out of room without bumping/tripping into anything (T) Suggestions: Remove doorsill __, door frame __, door __, or clutter __ furniture re-arranged __ Install offset-hinges __ purchase/install curtain for door __ other __ Resource:	Y__ N__ NA__
Sink is accessible Suggestions: remove vanity __ raise or lower sink __ other __ Resource:	Y__ N__ NA__

Toileting

Observation: raised toilet seat __ with attached grab bars __ toilet safety frame __ grab bar on wall __ other __	Y__ N__ NA__
Client can easily get on & off the toilet (T) Suggestions: raised seat __ with attached grab bars __ toilet safety frame __ grab bar on wall __ other __ Resource:	Y__ N__ NA__
Toilet paper roll is easy to use & less than one outstretched arm distance from toilet Suggestions: new roll __ relocate roll __ attachable bidet __ other __ Resource:	Y__ N__ NA__

Bathing

Observation: wall grab bar on back wall __ & side tub wall __ tub seat __ We do not recommend tub mounted grab bars as they can easily detach.	Y__ N__ NA__
Client lowers into bathtub or showers Suggestions: check stability of wall surface & order/install grab bars along back __ & inner tub wall __ contrasting color __ tub bench/hand-held shower hose __ shower curtain __ bath lift __ Resource:	Y__ N__ NA__
Client can easily reach/use faucets & controls Suggestions: lever adaptors __ hand-held shower hose __ hook at lower height __ other __ Resource:	Y__ N__ NA__
For frail elders at risk, anti-scald valves are installed in showerhead &/or bathtub spout Suggestions: install showerhead valve __ or bathtub spout __ other __ Resource:	Y__ N__ NA__

Non-skid safety treads or mat on bottom of bathtub

Suggestions: install treads/mat ___ other ___

Resource:

Y___ N___ NA___

Flooring**Bathroom flooring is non-skid (not slippery) with matte finish with no holes or rips**

Suggestions: no wax or non skid wax used ___ flooring repaired ___ new flooring ___ other ___

Resource:

Y___ N___ NA___

Bathroom floor mat is non-skid with intact backing & hung on side of tub when not in use

Suggestions: new floor bath mat ___ hang up floor bath mat ___

Resource:

Y___ N___ NA___

Floor surface is free from clutter

Suggestions: remove clutter ___ other ___

Resource:

Y___ N___ NA___

Sink Area**Faucets are easy-to-use**

Suggestions: faucet adaptors ___ non-flood faucets (for memory impaired) ___ other ___

Resource:

Y___ N___ NA___

Client can reach medicine cabinet

Suggestions: supplies rearranged ___ shelf installed ___ medicine cabinet lowered ___ other ___

Resource:

Y___ N___ NA___

Lighting (assessor, ask client if you can turn on all lights)**Lighting is adequate to client** (make recommendations if there are significant dark areas with lights on)Suggestions: new light bulb(s) ___ fixture(s) repaired ___ new light switch ___ or outlet repaired ___
new fixture(s) ___ switch extender ___ other ___

Resource:

Y___ N___ NA___

Nightlight is used (or flashlight or light left on)

Suggestions: automatic nightlights ___ battery sensor light ___ lighted switchplate ___ other ___

Resource:

Y___ N___ NA___

Kitchen

Accessibility

Client Uses Kitchen Y__ N__

Client moves in/out & through the room without bumping/tripping into anything (T) Suggestions: remove: doorsill __, door frame __, door __, or clutter __ install offset-hinges __ re-arrange furniture __ other __ Resource:	Y__ N__ NA__
Client has access to sink & to food preparation areas Suggestions: bottom cabinet removed __ cabinet under sink removed __ other __ Resource:	Y__ N__ NA__

Flooring

Kitchen flooring is non-skid (not slippery) with matte finish with no holes or rips Suggestions: no wax or non-skid wax used __ flooring repaired __ new flooring __ other __ Resource:	Y__ N__ NA__
--	--------------

Storage

Client can easily access needed food & supplies Suggestions: organize supplies __ reacher __ lazy susans __ "C" handles __ loop strap on refrigerator __ tape on refrigerator door gasket __ other __ Resource:	Y__ N__ NA__
---	--------------

Cooking & Serving

Faucets are easy-to-use Suggestions: faucet adaptors __ non-flood faucets (for memory impaired) __ other __ Resource:	Y__ N__ NA__
Client can easily use appliances pots/pans (T) Suggestions: appliance repair __ new microwave __ new toaster oven __ automatic coffee maker __ tactile dots __ large print dials __ pan/handles both sides __ pan/flat bottom __ flame retardant pot holder __ other __ Resource:	Y__ N__ NA__
Client can easily use utensils & plate (T) Suggestions: large handled utensils __ rocking knife __ can opener __ color contrast plate with scoop edge __ other __ Resource:	Y__ N__ NA__

Client can easily transfer food from kitchen to table (T) Suggestions: wheeled cart ___ attachable tray for walker or wheelchair ___ other ___ Resource:	Y___ N___ NA___
Stove area is clear of grease, towels & flammable materials Suggestions: cleaning service needed ___ rearrange materials ___ new hooks ___ other ___ Resource:	Y___ N___ NA___
Client Education: For fire safety, do not cook in clothing with long loose sleeves	

Lighting (assessor, ask client if you can turn on all lights)

Lighting is adequate to client (make recommendations if there are significant dark areas with lights on) Suggestions: new lightbulbs ___ lamp(s) repaired ___ new fixture(s) ___ battery-operated undercounter lights ___ switch or outlet repaired ___ other ___ Resource:	Y___ N___ NA___
--	-----------------

Indoor Stairs

Stairs are in good repair & usable by client Suggestions: install handrails on one side ___ install handrails on both sides ___ re-anchor handrails ___ remove clutter ___ repair stairs ___ remove carpeting ___ install low pile carpeting ___ install lift ___ install chair glide ___ relocate washer/dryer to first floor ___ relocate sleeping quarters to first floor ___ install bathroom on first floor ___ other ___ Resource:	Y___ N___ NA___
Edges of steps and landing are clearly visible Suggestions: install lighting/light switches ___ install color contrast paint/tape on step edge ___ other ___ Resource:	Y___ N___ NA___

Outdoors: Walkways, Porch, Stairs, & Door

Approach to house is adequate & well lit Suggestions: repair walkways ___ yardwork needed ___ install outdoor lighting ___ remove clutter ___ other ___ Resource:	Y___ N___ NA___
Stairs are usable by client Suggestions: install handrails on one side ___ install handrails on both sides ___ re-anchor handrails ___ remove clutter ___ repair stairs ___ install lift ___ install chair glide ___ install or repair ramp ___ Resource:	Y___ N___ NA___

Staircase, edges of steps & landing are clearly visible Suggestions: install lighting ___ install color contrast paint/tape on step edge ___ other ___ Resource:	Y___ N___ NA___
Porch has adequate railing, floor surface & lighting Suggestions: install/repair railing ___ install lighting ___ repair/replace flooring ___ other ___ Resource:	Y___ N___ NA___
Client can easily open/close door, open/close deadbolt & other locks, enter/exit dwelling, view visitors Suggestions: new doorknob ___ repair/replace lock ___ new door ___ new peephole ___ replace/remove threshold ___ new light fixture ___ other ___ Resource:	Y___ N___ NA___
Door bell is in working order & heard by client Suggestions: replace doorbell ___ install remote doorbell ___ Resource:	Y___ N___ NA___

Other

Extension cord/outlet strip with circuit breaker is used with multiple fixtures Suggestions: new extension cord/outlet strip ___ Resource:	Y___ N___ NA___
Client uses pillbox that is easy to read & use Suggestions: weekly multiple compartment pill ___ automatic dispenser ___ other ___ Resource:	Y___ N___ NA___
Walls & ceilings are free of holes & peeling paint Suggestions: repair ___ repaint ___ Resource:	Y___ N___ NA___
Smoke detector is in working order Suggestions: replace battery ___ replace detector ___ Resource:	Y___ N___ NA___
Temperature is comfortable to client (not overly hot or cold to assessor) Suggestions: repair windows ___ repair or purchase air conditioner ___ install large numeral thermostat ___ Resource:	Y___ N___ NA___
The dwelling is free of excess clutter and noxious odors Suggestions: cleaning service ___ other ___ Resource:	Y___ N___ NA___

Food bowls & kitty litter are out of circulation path Suggestions: set food bowls on table ___ relocate bowls or kitty litter ___ Resource:	Y___ N___ NA___
Client wears footwear that have closed backs & medium thickness treads Suggestions: new shoes/slippers needed ___ elastic shoelaces ___ Resource:	Y___ N___ NA___
Client uses glass ashtray (4"-6") with cutouts for cigarettes Suggestions: new ashtray ___ Resource:	Y___ N___ NA___
Frail or at risk clients have a personal emergency response system Suggestions: contact doctor for Medicaid prescription ___ other ___ Resource:	Y___ N___ NA___

Follow-Up

Bathroom	Kitchen
Bedroom	Living Room
Stairs, Indoors	Outdoors, Including Stairs

We gratefully acknowledge the support of the Isaac H. Tuttle Fund and the Ira M. Resnick Foundation.

October 1, 2005

www.cornellEG.org

15

APPENDIX I

Excerpt from the Office of Community Development Design Handbook. (OCD, 2008, p. 6)

F. Elder Dwelling units

In addition, elderly housing projects (for persons 55 years of age or older) must include:

1. Complete apartments provided rather than studio/efficiency units.
Complete apartment units (include kitchen, bathroom, living room, dining area, and bedroom) are appropriate for older persons because they prefer to cook, eat and entertain in their own apartments. Complete apartments are also non-institutional in appearance and provide greater privacy. Sufficient living/dining room space allows and encourage socialization with guests;
2. Individual treatment of apartment entryways that facilitates way-finding, reduces institutional appearance, and enhances individualism;
3. Window sill heights that are no greater than 32 inches above finished floor to allow viewing the outside from a seated position;
4. Pantry cabinetry provided in lieu of wall cabinets over the stove and refrigerator; and
5. Switches, and other operable devices, located no more than 48 inches above finished floor height, electrical outlets mounted between 18-24 inches above finished floor.

REFERENCES

- A Regional Coalition for Housing. (2009). *Accessory dwelling unit: Add a home to your house*. Retrieved from <http://www.archhousing.org/adu2/>
- Administration on Aging [AoA]. (2009). *Community innovations for aging in place*. Retrieved from http://www.aoa.gov/AoARoot/AoA_Programs/HCLTC/CIAIP/Index.aspx
- AoA. (2010). *Profile of older Americans: 2009*. Retrieved from http://www.aoa.gov/AoARoot/Aging_Statistics/Profile/index.aspx
- Altus, D. E., Xaverius, P. K., Mathews, R. M., & Kosloski, K. D. (2002). Evaluating the impact of elder cottage housing on residents and their hosts. *Journal of Clinical Geropsychology*, 8(2), 117-137.
- American Association of Retired Persons [AARP]. (1991). *Key issues in elder cottage housing opportunity (ECHO): Restrictions on manufactured housing*. Washington, DC: AARP.
- AARP. (2000). *Fixing to stay: A national survey of housing and home modification issues*. Washington, DC: AARP.
- AARP. (2009). *Kitchen*. Retrieved from http://www.aarp.org/families/home_design/kitchen/
- Antoninetti, M. (2008). The difficult history of ancillary units: The obstacles and potential opportunities to increase the heterogeneity of neighborhoods and the flexibility of households in the United States. *Journal of Housing for the Elderly*, 22(4), 348-375.
- Bakker, R. (1996). *Elder design: Designing and furnishing a home for your later years*. New York, NY: Penguin Books.

- Bakker, R. (2005). *GEM environmental assessment: Gerontological environmental modifications*. Retrieved from http://www.environmentalgeriatrics.com/pdf/enviro_assessment.pdf
- Bakker, R. (2009). [Multimedia course]. *Program for environmental geriatrics*. Retrieved from http://www.environmentalgeriatrics.com/multimedia_course/index.html
- Benbennick, D. (2006). *Map of New York highlighting Tompkins County*, Retrieved November 28, 2010, from: http://en.wikipedia.org/wiki/File:Map_of_New_York_highlighting_Tompkins_County.svg
- Better housing for Tompkins County [BHTC]. (2009a). *About us*. Retrieved from http://www.betterhousingtc.org/bet2_about.html
- BHTC. (2009b). *Better housing for Tompkins County, Inc. annual report 2009*. Ithaca, NY: BHTC.
- BHTC. (2009c). *Better housing for Tompkins County Inc. strategic plan 2009-2012*. Ithaca, NY: BHTC.
- BHTC. (2009d). *New York's first elder cottages*. Retrieved from http://www.betterhousingtc.org/bet2_cottages.html
- BHTC. (2010). *Reasonable accommodations/modifications policy*. Ithaca, NY: BHTC.
- Blah42. (2007). *Tompkins County, New York divisions*, Retrieved November 28, 2010, from: http://en.wikipedia.org/wiki/File:Tompkins_County,_New_York_Divisions.PNG
- Brawley, E. C. (2006). *Design innovations for aging and Alzheimer's: Creating caring environments*. Hoboken, NJ: John Wiley & Sons, Inc.
- Canada Mortgage and Housing Corporation. (2010). *Garden suites*. Retrieved from http://www.cmhc-schl.gc.ca/en/co/renoho/refash/refash_026.cfm

- Carle, A. (2010, March). *University based retirement communities*. Poster session presented at the annual Environments for Aging conference, San Diego, CA.
- Center for Disease Control and Prevention [CDC]. 2009. *Limitations in activities of daily living and instrumental activities of daily living, 2003-2007*. Retrieved from http://www.cdc.gov/nchs/health_policy/ADL_tables.htm
- Center for Inclusive Design & Environmental Access [IDeA]. (2009). *Visitability: An inclusive design approach for housing*. Buffalo, NY: IDeA.
- Chalmers, L., & Hall, G. B. (1991). Housing the elderly in New Zealand: The granny flat option. In N. M. Lazarowich (Ed.), *Granny flats as housing for the elderly: International perspectives* (17-29). Binghamton, NY: The Hayworth Press, Inc.
- Chapman, N. J., & Howe, D. A. (2001). Accessory apartments: Are they a realistic alternative for aging in place? *Housing Studies*, 16, 637-650.
- Connell, B.R., Jones, M., Mace, R., Mueller, J., Mullick, A., Ostroff, E., Sanford, J., Steinfeld, E., Story, M., & Vanderheiden, G. (1997). *The principles of universal design*. NC State University: The Center for Universal Design. Retrieved from http://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciplestext.htm
- Cornell University. (1986). *Housing options for seniors today*. [Pamphlet]. New York: Cornell University.
- Department of Human Services. (2010). *Summary of housing assistance programs 2008-2009*. Retrieved from http://www.housing.vic.gov.au/__data/assets/pdf_file/0005/412988/Summary-of-Housing-Assistance.pdf
- Department of Justice. (1994). *Code of federal regulations: ADA standards for accessible design*.
- Dickinson, E. E. (2008). Old age, new models. *Architect*, 97(12), 70-75.

- Dunn, J.R. (2002). Housing and inequalities in health: A study of socioeconomic dimensions of housing and self reported health from a survey of Vancouver residents. *Journal of Epidemiology and Community Health*, 56, 671-681.
- Elizabethtown College. (2010). Family. *Amish studies*. Retrieved from <http://www2.ETOWN.EDU/amishstudies/Family.asp>
- Executive Director of Housing & Community Building. (2010). Movable units. In *State government of Victoria, Australia, department of human services*. Retrieved from <http://www.housing.vic.gov.au/home-owners-assistance/moveable-units>
- FabCab. (2010). *FabCab*. Retrieved from <http://fabcab.com/about/what-we-do/>
- Feathers, D. (2009, December). *Slips, trips, and falls*. Powerpoint presentation presented in DEA 4520: Biomechanics and the Built Environment, Cornell University, Ithaca, NY.
- Foodnet. (2010). *Foodnet meals on wheels*. Retrieved from <http://www.foodnet.org/>
- Guion, E. (n.d.). Note from Ed Guion. *Elder cottages*. Retrieved from <http://eldercottages.com/note.php>
- Hare, P.H. (1991). The echo housing/granny flat experience in the US. In N. M. Lazarowich (Ed.), *Granny flats as housing for the elderly: International perspectives* (57-70). Binghamton, NY: The Hayworth Press, Inc.
- Hays, J.C., (2002). Living arrangements and health status in later life: A review of recent literature. *Public Health Nursing*, 19, 136-151.
- Holmes, H., Beissner, K., Welsh, K., & Krout, J.A. (2003). Housing, health and disability. In J.A. Krout & E. Wethington (Eds.), *Residential choices and experiences of older adults: Pathways to life quality* (pp. 117-134). New York, NY: Springer Publishing Company.
- Housing Act 1983. 005. No. 10020 of 1983. (2010).

- Jordan, W. A. (2008). *Universal design for the home: Great-looking, great-living design for all ages, abilities, and circumstances*. Beverly, MA: Quayside Publishing Group.
- Kochera, A., Straight, A., & Guterbock, T. (2005). *A report to the nation on livable communities: Creating environments for successful aging*. Retrieved from http://assets.aarp.org/rgcenter/il/beyond_50_communities.pdf
- Koebel, C.T., Beamish, J., Danielsen-Lang, K., & Steeves, J. (2003). *Evaluation of the HUD elder cottage housing opportunity (ECHO) program*. Blacksburg, VA: Center for Housing Research Virginia Polytechnic Institute and State University.
- Koones, S. (2010). *Prefabulous + sustainable: Building and customizing an affordable, energy-efficient home*. New York, NY: Abrams.
- Krueger, B., & Stewart, N. (2010). *Universal design: A step-by-step guide to modifying your home for comfortable, accessible living*. Guilford, CT: Morris Book Publishing, LLC.
- Lasoff, S., & Lorentzen, L. (2003). *The accessible home*. Minneapolis, MN: Fairview Press.
- Lawlor, D., & Thomas, M. A. (2008). *Residential design for aging in place*. Hoboken, NJ: John Wiley & Sons, Inc.
- Lawton, M. (1989). Behavior relevant ecological factors. In k. Schaie & C. Schooler (Eds.), *Social structure and aging*. Hillsdale, NJ: Erlbaum.
- Lazarowich, N. M. (1991a). Granny flats in Canada. In N. M. Lazarowich (Ed.), *Granny flats as housing for the elderly: International perspectives* (31-39). Binghamton, NY: The Hayworth Press, Inc.

- Lazarowich, N. M. (1991b). Preface. *Granny flats as housing for the elderly: International perspectives* (p. ix-xi). Binghampton, NY: The Haworth Press, Inc.
- Lichtman, J. (2010). *Personal photographs of better housing for Tompkins County's elder cottages*. Ithaca, NY: Cornell University.
- Lodl, K.A., Gabb, B.S., & Combs, E.R. (1990). The importance of selected housing features at various stages of the life cycle. *Lifestyles: Family and Economic Issues*, 11, 383-395.
- Maisel, J.L., Smith, E., Steinfeld, E. (August 2008). *Increasing home access: Designing for visitability*. Retrieved from http://assets.aarp.org/rgcenter/il/2008_14_access.pdf
- Maynard, N. F. (2008). 10 things you need to know about modular homes. *Builder*, 31(1), 141-146.
- Miller, S. L. (2010). *Architects share design trends*. Custom Home Online. Retrieved from: <http://www.customhomeonline.com/industry-news.asp?sectionID=204&articleID=1324241>
- Moore v. East Cleveland, 431 U.S. 494 (1977)
- N2Care (2010a). *History of N2care*. Retrieved from <http://www.medcottage.com/news/history.html>
- N2Care (2010b). *MEDcottage*. Retrieved from <http://www.medcottage.com/>
- NCB Capital Impact (n.d.). *The green house project: Mission and vision*. Retrieved from <http://www.ncbcapitalimpact.org/default.aspx?id=664>
- National Association of Homebuilders [NAHB]. (2007a). *Design/build solutions for aging and accessibility*. Washington, DC: NAHB.
- NAHB. (2007b). *Marketing and communication strategies for aging and accessibility*. Washington, DC: NAHB.

- NAHB. (2009). *Learn about aging in place and what a professional can do for you*. Retrieved from <http://www.nahb.org/generic.aspx?sectionID=717&genericContentID=46799>
- National Safety Council. (2009). *Preventing slips and falls in the home*. Retrieved from http://www.nsc.org/news_resources/Resources/Documents/Preventing_Slips_and_Falls_in_the_Home.pdf
- New York State Department of Transportation [NYSDOT]. (2010). *Title 3, article 10, section 385 – dimensions and weights of vehicles*. Retrieved from <https://www.nysdot.gov/nypermits/repository/vlt-section-385.html>
- New York State Office for the Aging. (2009). *Demographic changes in New York state*. Retrieved from <http://www.aging.ny.gov/NYSOFA/Demographics/DemographicChangesinNewYorkState.pdf>
- Office of Community Development [OCD]. (2008). *Design handbook*. Albany, NY: U.S. New York State Division of Housing and Community Renewal.
- Oswald, F., & Wahl, H.W. (2004). Housing and health in later life. *Reviews on Environmental Health, 19*, 223-252.
- Oswald, F., Wahl, H.W., Schilling, O., Nygren, C., Fänge, A., Sixsmith, A., Sixsmith, J., Széman, Z., Tomsone, S., & Iwarsson, S. (2007). Relationships between housing and health aging in very old age. *The Gerontologist, 47*, 96-107.
- Pearlin, L.I., & Schooler, C. (1978). The structure of coping. *Journal of Health and Social Behavior, 19*, 2-21.
- Pollak, P. (1999). Side by side – elder cottages support independence for older persons. *Human Ecology Forum, 27*, 22.
- Power, B. (1991). Granny flat as housing for the elderly: International perspectives. *Journal of Housing for the Elderly, 7*, 1-15.

- Quadagno, J. (2008). *Aging & the life course: An introduction to social gerontology* (4th ed.). New York, NY: McGraw-Hill Companies, Inc.
- Rebuilding Together. (2009). *About us*. Retrieved from <http://www.rebuildingtogether.org/section/about/>
- Thomas, B. (2010). *The green house project*. Retrieved from <http://changingaging.org/the-green-house-project/>
- Thomson, H., Thomas, S., Sellstrom, E., & Petticrew, M. (2009). The health impacts of housing improvement: A systematic review of intervention studies from 1887 to 2007. *American Journal of Public Health, 99*. doi:10.2105/AJPH.2008.143909
- Tompkins Community Action. (2010). *Housing choice vouchers*. Retrieved from http://www.tactionweb.org/cms/index.php?option=com_content&view=article&id=55:housing-choice-voucher-program&catid=36&Itemid=69
- Troyer, L. S., & Troyer, T. L. (2010, March). *Southfield: An intergenerational community: The process of planning, designing and building for success*. Poster session presented at the annual Environments for Aging conference, San Diego, CA.
- U.S. Census Bureau. (2004). *Projected population of the United States, by age and sex: 2000 to 2050*. [Data file]. Retrieved from <http://www.census.gov/population/www/projections/usinterimproj/natproptab02a.pdf>
- U.S. Census Bureau. (2008). *Americans with disabilities: 2005. Household economic studies*. Washington, DC: U.S. Department of Commerce.
- U.S. Census Bureau. (2010). *Tompkins county quickfacts from the US census bureau*. Retrieved from <http://quickfacts.census.gov/qfd/states/36/36109.html>

- U.S. Department of Health & Human Services. (2009, June 9). *Acting Surgeon General issues 'call to action to promote healthy homes'* [Press release]. Retrieved from <http://www.hhs.gov/news/press/2009pres/06/20090609a.html>
- U.S. Department of Housing and Urban Development. (2010). *Home investment partnerships program*. Retrieved from <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/>
- U.S. Green Building Council [USGBC]. (2008). *LEED for homes rating system*. Washington, DC: USGBC.
- Wacker, R.R., & Roberto, K.A. (2008). *Community resources for older adults: Programs and services in an era of change* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Wilkinson, R., Marmot, M. (2003). *The solid fact: social determinants of health*. World Health Organization, Copenhagen, DE: WHO.
- World Health Organization (2007). *Large analysis and review of European housing and health status (LARES)*. Copenhagen, DE: WHO Regional Office for Europe.
- Zeisel, J. (2006). *Inquiry by design*. New York, NY: W. W. Norton & Company, Inc.